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A

MANUAL OF DIETETICS

BY

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"WHAT IS ONE MAN'S FOOD IS ANOTHER MAN'S POISON."

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To

FORDYCE BARKER, M.D., LL.D., EDIN.,

AN ACKNOWLEDGED LEADER IN MEDICINE,

THIS WORK

IS AFFECTIONATELY DEDICATED

BY

THE AUTHOR.

PREFACE.

The day of Dietetics has arrived.

Modern advances in our knowledge of the physiology of digestion have been accompanied by a like progress in the preparation of foods. The value of predigested carbohydrates in acute disease and malassimilation among adults, as well as children, is now being gradually realised. The digested albuminoids are making their way; while oil emulsions have established themselves on a firm footing. The many evils of a dietary too rich in albuminoids are now being generally recognised. The time indeed is at hand when systematic lectures on Food will be a part of Medical education; while the value of feeding in disease is admitted to be as important as the administration of medicines.

3, Henrietta Street,
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London, W.

CONTENTS.

PART I.

CHAP.		PAGE
	I.—FOOD: Its Object,	1
	II.—Forms of Food and their Digestion,	6
	III.—Methods of Preparing Food,	23
	IV.—Condiments,	39
	V.—Beverages,	42
	VI.—Stimulants,	49
	VII.—Fluid Foods,	64
	VIII.—Preserved and Canned Foods,	72
	IX.—Prepared Foods,	79
	X.—Artificial Digestive Agents,	85

PART II.

	XI.—Food in Infancy,	96
	XII.—Food in Adolescence,	109
	XIII.—Food in Adult Life,	118
	XIV.—Food in Old Age,	130
	XV.—Food in Acute Disease,	137
	XVI.—Food in Convalescence,	147
	XVII.—Food in Gastric Affections,	153
	XVIII.—Food in Struma,	157
	XIX.—Food in Anæmia,	163
	XX.—Food in Constipation and Diarrhœa,	167
	XXI.—Food in Phthisis,	171
	XXII.—Food in Chronic Heart and Lung Disease,	183

PAGE

CHAP. XXIII.—Food in Bright's Disease, ... 189

XXIV.—Food in Albuminuria, ... 195

XXV.—Food in Diabetes, ... 197

XXVI.—Food in Glycosuria, ... 203

XXVII.—Food in Gout, ... 205

XXVIII.—Food in Neurosal Affections, . . . 216

XXIX.—Food for Chronic Invalids, ... 222

XXX.—Food in Obesity, ... 226

XXXI.—Food in Indigestion, ... 230

XXXII.—Food in Biliousness, ... 242

XXXIII.—Food given otherwise than by the Mouth, . 250

Conclusion, ... 254

MANUAL OF DIETETICS.

CHAPTER I.

THE OBJECT OF FOOD.

Before the days of chemistry, food was in its pre-scientific stage. Then it was mainly a question of the palate. Kings kept their cooks, and smaller personages imitated them. The cooks cooked by day and devised new dishes by night. In the present work, however, this culinary aspect of food will be subordinated to that of its scientific aspect.

Not that the cook is to be ignored, by any means. Without proper cooking, no food is palatable; and if the palate—the janitor of the stomach—be offended, no matter what is its real value, the food is useless. The palate must be consulted as well as the stomach.

Of old the palate ran riot. The Romans were both epicures and gluttons. The oysters of Britain were conveyed by relays of runners to the Roman villas. One epicure cast a slave into his fishpond to improve the flavour of his lampreys. The most absurd dishes were contrived, up to a pie of nightingales' tongues. Their tastes were not ours. Fowls were boiled in aniseed water, and served with a sauce containing aniseed, mint, mustard seeds and asafœtida. Nor were the middle ages far different. Charles V. of Germany was a notorious gourmand. Besides ordinary meats he had roasted horse, cats in jelly, lizard soup, fried frogs, etc., till his *chef* when asked for a new dish, could only suggest a compote of watches, —in allusion to that monarch's passion for such time-keepers.

Animals were chased because it was found that the flesh of hunted beasts was more tender and palatable than that of those killed without such preliminary preparation. Fowls were thrashed to death to fit them for the table; while one writer gave directions

"How to roast and eat a goose alive." No cruelty to an animal was too great to gratify the palate. It was merciless!

The amount eaten, too, was enormous. The Roman had five meals a day; and at great feasts when full to repletion, the stomach was emptied in order that the process of filling it might be re-commenced.

Charles V. was quite as big a glutton as he was an epicure. At a dinner of the Knights of the Golden Fleece Roger Ascham saw him make his way through sod beef, roast mutton, and baked hare, after which he fed full well on a capon. Nor did he forget to drink with it all. "He had his head in the glass five times as long as any of them, and drank no less at once than a quart of Rhine wine." No wonder he became a gouty man.

Then views as to food varied in the widest manner. The English athlete placed his faith in rare beefsteaks and raw eggs; while the Hindoo wrestlers trained on sweetmeats. The English farmer feeds his servants on meat in order that they may be equal to hard work; just as he adds some extra corn to the dietary of his horses when working hard. The hama of Stamboul carries incredible weights on a dietary which the English athlete would regard as utterly insufficient to support life; and for backsheesh is grateful for a slice of melon.

Cookery-books were written by men of learning. Even Dr. Johnson, of dictionary fame, did not think the subject beneath him. "I could write a better book of cookery than has ever yet been written," he boasted. "It should be a book on philosophical principles." So important did he deem the subject that he said contemptuously: "A woman may spin, but she cannot make a good book of cookery." Dr. Kitchener, the author of "The Cook's Oracle," had a library of works devoted to food and cookery, consisting of no less than 250 volumes. It cannot then be said that the subject has not received due attention in all ages.

It is only at the present day, and from the teaching of Liebig, that food has been regarded from a scientific point of view: both as regards the hale and the sick. It is our knowledge of organic chemistry which is guiding us to a rational comprehension of the utility of food, and the requirements of the organism. Before that day the palate ruled, and tastes vary. *De gustibus non disputandum!*

The Burmese bury their fish until it is putrid, in order to give it the flavor they relish; while the Sandwich Islanders like their fish so fresh that they devour fish alive as soon as caught.

Europeans prefer a fresh egg; in Cochin China the people prefer them "high." The Israelites talked of a land of "corn and wine" and of "oil and honey." The Egyptians lived on lentiles; while the Arab exists upon dates.

The Hindoo and the Negro both delight in boiling rice and butter. Ghee is clarified butter; and the Hindoo in praising anything comestible, couches his highest praise in the phrase "as good as ghee!" On the other hand, the Gauchos of the South American pampas live solely on lean beef and water; and Sir Francis Stead has told us what power of endurance this diet gives. The Eskimo and the natives of Northern Asia eat huge quantities of fat, and drink oil. This diet is a perfect contrast with that of the desert Arab. On the burning desert little is required to maintain the body heat, and a handful of dates is sufficient for the body-needs. On the frozen Arctic wastes, fat, the strongest fuel-food, is required in considerable quantities to keep the body temperature at a point compatible with life. Cut off from farinaceous food, the Eskimo rejoices in the liver of the walrus, with its glycogen, or animal starch; but to give it a higher heating power, he eats it with slices of fat. Instinctively man has adopted the dietary suited to his needs; and the Anglo-Saxon who, on the plains of Bengal, persists in the roast beef and ale of Old England, pays the penalty of his dietary indiscretion in hepatic trouble. Blindly and darkly then, instinct has guided man in his choice of food, before the daylight of organic chemistry came to direct his path aright. Light has dispelled the darkness; but the palate is not to be dethroned. There are other things that cling to us as well as original sin! The belief in meat is ubiquitous with the Anglo-Saxon. No one can be strong without meat, it is asserted.

"Many people seem to look upon meat almost as though it formed the only food that really nourished and supplied what is wanted for work. The physician is constantly coming across an expression of this view. Undoubtedly, a greater feeling of satiety is produced by meat than by other food. It forms a greater stay to the stomach, but this arises from the stomach constituting the seat of its digestion; and a longer time being occupied before it passes on and leaves the organ in an empty condition." (Pavy on Food and Dietetics.)

This fallacy is disproved by the fact that the Sikhs of the Punjaub are pulse-eaters. The Italian lives almost solely on maize and macaroni. The dreaded Iroquois were cultivators of maize as well as hunting Indians. The Spaniard munches his onion and dips his

crust of bread in oil. The Kaffir, like the Kirghis, lives mainly on milk; as did the Cymri, when Cæsar invaded Britain. The Arab has his dates. The Brahmin prefers the banana. The Hindoo, the Chinese and the Japanese, find their chief sustenance in rice, which with them takes the place of bread with us. Bread or its farinaceous equivalent is the staff of life. But "thou shalt not live by bread alone" tells that something in addition is necessary for the food of man.

What is that something? Milk; certainly! Meat? No, emphatically No! Fat, Yes!—especially butter. Some fluid is, of course, necessary as water. Here we have all that is required. There is starch, body-fuel; there is albumen for tissue-repair in the gluten; there are earthy salts, too, especially if the bread be made of whole meal; and then there is the fat, which partly is burnt as body-fuel, partly engaged in the building up of healthy tissue.

Let us trace the history of a mouthful of bread and butter. While it is being masticated, the saliva is brought into contact with many of the starch granules (already cracked by the heat of the oven and, not only that, but a step forward has thus been made in its solution,) and the conversion of insoluble starch into soluble sugar is begun. Then it is swallowed, when a new action is set up. The soluble grape sugar of the converted starch passes through the wall of the stomach into the gastric vesicles of the portal vein; leaving the undissolved residuum behind. The acid gastric juice next acts upon the gluten, the albuminous stroma, or framework of the mass—and by dissolving it, liberates the rest of the starch granules which had escaped the contact of the saliva. When the softened mass passes the pyloric ring, and comes into contact with the bile and the secretion of the pancreas, the most active part of the digestive act sets in. The liberated starch granules come into contact with the diastase of the pancreatic secretion, and are by it converted into soluble grape sugar; the digestion of the albuminous substances is further carried on by the trypsin; the fat is emulsionised —it is only digestion. The sugar, the dissolved albuminoids, the earthy salts, pass into the portal vein, to be dealt with by the liver; while the fat globules pass by the mouths of the lacteals into the lymphatics. Such is the digestion of a typical mass of food; there are here, carbo-hydrates (starch and sugar), albuminoids, fat, and earthy salts. And let all the art and skill of all the cooks who ever lived, collect, cook and flavour the various edible substances of the animal and vegetable world, *these* are the constituents of the food of Man.

The carbo-hydrates are the body-fuel, the surplusage being stored as fat; the albuminoids serve to repair the tissues as they wear out; the salts form the blood-salts; the fat helps to build up normal health-tissues, the excess being burnt as body-fuel. That is the real object of food!

But Nature has veiled her object. She provides an imperious palate, engrafted upon an imperative sense of hunger, and these secure the nutrition of the body. Succulent vegetables, luscious fruits, sapid flesh; such are the materials upon which the cook exercises his art; and such are the food of the savage. While milk, the natural food of the new-born, alone or in combination with (chiefly) vegetable matter, is ever acceptable. Hunger compels the individual to take food to fill the stomach; the palate guides him in his choice; if the food be simple, there is little or no temptation to indulge in excess. But when the cook's art tempts the palate, then comes in the temptation. The first temptation came through the palate—"the tree was good for food;" and Adam hearkened into the voice of Eve, and ate of the tree—and the history of human troubles began. Now, the man has hearkened to the voice of the tempter, and eats—in excess of his body-needs. He must eat to live; but that is not the true equivalent of to live to eat. The object of food is the nutrition of the body—rather than the gratification of the palate. It may be well next to examine these different constituent elements of food in fuller detail both as to their digestion and their destiny.

CHAPTER II.

FORMS OF FOOD—WITH THEIR DIGESTION.

Carbo-hydrates—Albuminoids—Fat-salts.—Liebig's great division of food into hydro-carbons, or "fu l-food," and albuminoids, or "tissue-food," though at one time subjected to much criticism has, in the main, stood its ground. Modern advance in physiological chemistry certainly has told us that albuminoids are oxidised in their retrograde metamorphosis and so contribute to the body-heat; we know, too, that fat is necessary to the formation of healthy tissue—as seen in the cod liver oil so much in repute for the treatment of phthisis—and so to some extent is a tissue-food, as well as a fuel-food. Even certain salts, as the malates, the citrates and the tartrates are a fuel food, in that the malic, citric and tartaric acids are oxidised, while the base (largely potash), appears in the urine as a carbonate or may be a lithate. The muscles require potash and the blood soda; why we do not yet quite know. The bones call for lime; and admitting that Liebig's view is not precisely accurate, it is true as a broad division; and is well worth bearing in mind. Why? Because since the days when Cain kept sheep, and gave way to ungovernable temper and behaved like a carnivorous brute, in his murderous instincts, man has been tempted to take meat to gratify his palate, to an extent far beyond his real tissue-needs. Man is like a steam engine in that he is a piece of mechanism in which fuel is burnt. Certainly the iron framework of the engine rusts—a slow oxidation—and needs repair; and so do the tissues of man wear out. The engine needs oil to lubricate its bearings, and sundry other matters which have to be continuously supplied to it. The animal body has other wants than merely "fuel-food" and "tissue-food," as salts for instance. The engine is a means of heating water into steam, and then utilising that steam to put wheels into motion, *i. e.*, converting heat into motor power. When the engine is working hard it uses so much more water and fuel. When a man exerts himself he also produces more heat by increased oxidation and consumption of fuel-food. Liebig doubtless was in error in assuming that in activity the albuminoid tissues are consumed.

No more than the framework of a locomotive when ascending an incline. An engine doing hard work will need more oil for its lubrication than one doing little work; and probably will sooner have to be sent to the repairing shed. A hardworking man may wear out his muscles at a more rapid rate than an idle man. But all the same in the locomotive and the man, the framework and the tissues do not "burn," but rust, or undergo a slower oxidation. (In forming conclusions from the amount of urea—the body ash—the perpetual and ineradicable difficulty has to be met that urea is the final soluble form of nitrogenised waste derived alike from the *luxus consumption*, or surplusage of albuminoid food and from effete or worn-out tissue.) Just as when the body is at rest its temperature is maintained by oxidation of hydro-carbons, so in activity the combustion is the same; only greater. Consequently the tissue-food for tissue-repair actually required is small, and more albuminoids are usually eaten than are absolutely needed. Granting that the general health of convicts deteriorates on an insufficient dietary; and that the system suffers when imperfectly fed; and that when work is hard more food, especially of the stimulating nitrogenised character is given, as the result of the teaching of experience; still the main fact remains unaffected, viz., that the actual wear and tear of the albuminous tissues is small, and can really be met by a dietary far less rich in azotised matter than that taken by most persons. Look at the lusty babies fed on "Pobbs," consisting of bread and water (with little if any milk), to be seen in any agricultural district in England. See the huge navvy "Lincolnshire bred," reared on bread and bacon, or dripping and potatoes; or the Scotchman built up on oatmeal; and we can understand that the constructive powers of the human organism can successfully contend with great difficulties. But all the same, when the navvy can procure some beefsteak he can do a harder day's work; and, I am informed, that a Highland gillie, when he shares the sportsman's repast—a dietary superior to that to which he is accustomed—waxes in vigour and energy, in an obvious and unmistakable manner; while Dr. Furguson of Bolton has told us of the improvement in the physique of the children of the Lancashire operatives when a certain amount of milk was added to their bread and butter and tea.

Keeping in mind then Liebig's great generalisation (while admitting that it is not absolutely correct as to minutiæ) we find the food of man ranging itself into three main divisions—

1. Carbo-hydrates;
2. Albuminoids;
3. Fat;

With a small sub-class—

4. Salts.

Water too is essential to the body, but it cannot exactly be classed as a "Food."

Carbo-hydrates.—Under the term Carbo-hydrates are classed the starchy, or farinaceous, or amyloid (as we choose an English, a Latin, or a Greek term), and the saccharine elements of our food.

Starch consists of Carbon, Nitrogen and Oxygen (having the formula $C_6H_{10}O_5$) and is found in all the cereals; especially in those used as the food of man, wheat, oats, barley, maize and rye; it is also found in the pulse tribe, or legumes, as the pea, bean, lentil and the haricot bean, as also the dahl of India; also in rice, buckwheat, sago, tapioca and arrowroot, and the quino of Peru. It abounds in the potato, and other roots (which contain the germs of the new plant), in carrots, parsnips and turnips which first produce a root, from which again a seed-bearing stem is developed; and is part of the unripe fruit, which becomes sweet as the starch is changed or converted into sugar.

Starch is the food of the seedling plant. To take the case of a grain of any cereal, it contains starch, albuminoid matter, and earthy salts; while oats and maize also contain notable quantities of fat. When the plant germinates the starch is converted into sugar, (as the baby plant requires it) by the action of the diastase (an albuminous ferment), as the seedling grows. Insoluble starch is converted into soluble sugar in the grain; just as it is in the human mouth. The plant stores up food for its young; and that food man takes for his own use. Why does the store of plant food take the form of insoluble starch? Because if soluble it would be liable to be dissolved by water; and after rain the grain field would be barren, because the food elements were washed away in solution. Insoluble starch can be stored.

A rapid germination is artificially set up by the process of "malting"; which will occupy our attention further on.

When man ate uncooked grain, as he did at an early period (as the worn molars of graminivorous men still tell us when dug up), he ground it slowly under his teeth; and during this time the starch came in contact with the saliva, which by its diastase converted this

starch into soluble dextrine (with the starch formula) and grape sugar ($C_5H_{12}O_6,H_2O$). The action was exercised upon the outside of the starch granule; the remainder passing on through the stomach till it reached the diastase of the pancreatic secretion, when it became fully dissolved. (All starch granules however are not equally acted upon, and where much starch food is taken a certain quantity of them are to be found in the fæces.)

When man came first to crush and then to grind and cook his food, a new departure took place. The toil of grinding his grain was done for him in a less laborious manner. Disintegration took place in the mill. He could eat faster. But if no other change had gone on, this might have been a very questionable advantage; for it would have had the result of filling his stomach with insoluble starch granules (a fertile source of indigestion). The effect of heat upon the starch granule is to crack it and thus to form a channel by which the saliva could reach the interior; an important matter. But another change goes on of which the knowledge is far less general. The starch is converted largely into soluble dextrine. (When a portion of well-baked flour is subjected to the iodine test, the conversion of the starch is readily seen.) Consequently the farina is speedily transformed into soluble matters by the saliva. The existing dextrine is carried forward to grape sugar; while the remaining starch is largely changed into dextrine. Such then is the effect of the act of cooking upon the starch granule. Grinding and cooking lessen the labor of the jaws and the salivary glands.*

Disintegration and solution constitute the digestive act. The conversion of starch into grape sugar is brought about by the salivary diastase (an albuminous body whose formula has not yet been determined), by a process of hydration; and grape sugar has the formula) $C_6H_{12}O_6H_2O$), *i.e.*, some water has been introduced into the molecule. The saliva is operative in the mouth and in the gullet, and also in the stomach until it becomes distinctly acid. The soluble grape-sugar passes through the wall of the stomach into the blood.

This removal of much of the starchy matter of the food allows the stomach to act upon the other constituents. When food is hastily swallowed, our mastication is imperfect from bad teeth, the

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* Grain and bread crusts developed the jaws and teeth. The soft food now in vogue for infants is one factor in the prevailing dental decay.

stomach is hampered and embarrassed by quantities of unchanged starch, and its digestion is slow and painful.

When the stomach becomes distinctly acid, the conversion of starch is arrested. When the stomach has done its work and gastric digestion is complete the acidity seems pretty much exhausted, and the chyme (as the pultaceous mass is termed) finds its way into the duodenum, where it becomes mixed with the bile and the pancreatic secretion. In this alkaline medium the pancreatic diastase comes into play, and the transformation of insoluble starch into soluble dextrine and grape-sugar re-commences. As the more or less disintegrated or denuded starch granules pass along the small intestine they become fully dissolved into grape-sugar which passes into the blood of the portal vein.

Such then is the digestion of starch. But before following up the history of grape sugar in the body, it will be well to consider the different forms of sugar. Sugar may be divided into crystalline or cane sugar ($C_{12}H_{12}O_{11}$) and glucose or grape sugar. The crystalline sugar is the object of the sugar-baker; and the fæces of sugar boiling, treacle or molasses, are the non-crystallisable sugar. On the other hand non-crystallisable, or invert sugar, otherwise levulose, is the object of the manufacturer who supplies the brewer with substitutes for malt. Crystalline sugar is found in the sugar cane, the beet root, other roots, the maple and the sugar grass. Both are sweet to the taste; crystalline sugar being more intensely sweet, while the flavour of non-crystalline sugar is finer to most palates. As sugar is the food of the seedling plant, so sugar is found in all young shoots (notably in those of the briar and the grasses, as all rural children know).

"Although cane sugar requires no digestion to fit it for absorption it may be considered probably that it undergoes conversion into grape-sugar, certainly in part, if not wholly before leaving the alimentary canal. If cane sugar be introduced into one of the vessels of the general circulation, it passes off from the system without being utilised and escapes, still in the form of cane sugar in the urine.[1]

If, however, cane sugar be introduced into the alimentary canal beyond the capacity, say, for subsequent assimilation, sugar similarly passes off with the urine; but now in the form of grape sugar instead of cane sugar." (Pavy.)

When the soluble grape sugar—whether derived from starchy or saccharine elements of our food it matters not—passes into the portal vein, it flows thereby to the liver. Here it is dehydrated, or

turned back into glycogen, or animal starch ($C_5H_{10}O_5$). In this insoluble form once more it can be stored for the body needs. Carbohydrates then furnish the glycogen or body-store of fuel in the liver. The liver stores up from each meal so much glycogen; and gives it off as required; otherwise life would be only one dreary meal. (Any disturbance in these glycogenic arrangements leads to the presence of sugar in the urine. These disturbances may extend from the mere presence of sugar in the water after a meal, when the dehydrating power of the liver cannot keep pace with the diastatic activity, up to the dread disease diabetes.)

The insoluble store of glycogen is given off as required in the form of soluble grape sugar; which is probably burnt up as lactic acid ($C_6H_{12}O_5$) in union with soda, as lactate of soda. (Muscles have their little stores of glycogen; the muscles of the embryo being especially rich in it.)

Such then is the history of the Carbo-hydrates, our great "fuel-food"; corresponding to the coal in the tender of the locomotive. The surplusage of grape sugar forms the fat, or adipose tissue of the body: a further reserve of "fuel-food." The store of glycogen in the liver is readily got at, and so we may liken it to the coal-scuttle by the fireside, while the fat deposit is the coal cellar. In some individuals it is spread over the body generally; while in others the omentum and parietes of the abdominal muscles are its chief seats.

In some animals, as the pig for instance, the fat is wide-spread and general, while in the camel the fat is stored in the hump, and in the codfish the liver is the seat of the storage of fat, as well as of glycogen.

This grape sugar is the natural body fuel, and where it is burnt up, the organism perishes of exhaustion; whether in starvation or acute disease. This matter will be further discussed when the dietetic treatment of exhaustion is given further on.

Albuminoids.—Albumen is a complex body notably containing nitrogen. This is the cardinal matter which fits it for the non-oxidisable framework of the body in which the combustible hydro-carbons are burnt. "Of all the elements of the animal body, nitrogen has the feeblest attraction for oxygen; and, what is still more remarkable, it deprives all combustible elements with which it combines, to a greater or less extent, of the power of combining with oxygen, that is, of undergoing combustion." (Liebig.)

By virtue of this nitrogen-factor then, the albuminous tissues are prevented from the body-combustion extending to them. Like the

framework of the locomotive they *rust* but do not *burn.* Their composition is as follows:

$$O_{21}H_7N_{15}C_{53}S_1$$

From this we can see that they differ from the hydro-carbons in the fact that they contain some sulphur as well as a distinct amount of nitrogen. The egg from which the living bird is developed contains albumen, some fat, and water. Probably the shell furnishes the lime. White of egg is typical albumen. Albumen is found in the muscles or flesh of animals; it is found in milk, as caseine, and in all seeds, notably the pulse tribe, whose seeds are rich in vegetable caseine. A certain proportion is found in cereals as the gluten of wheat, for instance.

It is as necessary for the seedling to build up its tissues as it is for a baby. The ferment of seeds which converts starch into grape sugar, is an albuminous body. Albumen in a fluid form as the white of egg, coagulates and forms a firm white solid on boiling. Yet caseine, as in cheese, softens under heat. Milk does not coagulate on boiling; but meat juice does. Consequently if an infusion of meat be raised to the boiling point the albumen is coagulated. Beef tea raised to the boil and strained loses (with its albumen), what food-value it possesses.

Flesh cooked before the rigor mortis sets in, is readily masticated; and the Abyssinian it is said cuts his steak from the living ox as he wants it. Once the rigor mortis has set in the flesh is hard and tough; consequently it is customary to keep it until this has passed away before cooking it. The effect of cooking upon muscle is to loosen the muscular bundles or fibrillæ from each other, so that they are readily torn asunder and crushed by the teeth. Insufficiently cooked meat is hard and resists the action of the teeth; over cooked meat is stringy. Perfectly cooked flesh is more savoury than either underdone or overdone meat. When taken into the mouth the muscular fibres are torn asunder and crushed by the act of mastication; so that when they enter the stomach the gastric juice can readily attack them. If meat be not chewed but bolted, the solvent juice can only act upon the exterior of the mass; while "lumps" offend the stomach and arrest the gastric secretion, as was found in the case of Alexis St. Martin. Solution is at work under the influence of pepsine aided by an acid. "The natural bundles of meat and vegetables fall asunder; the muscular fibres split up into discs, and the protoplasm is dissolved from the vegetable cells." (M. Foster.)

The albuminous stroma of bread or liver is dissolved and the

starch granules set free; while the albuminous envelope of the fat cells (adipose tissue) also is dissolved and the fat is left free. The food is changed into a pultaceous mass, "such pieces as most resist the gastric juice being the last to leave the stomach." The digestive action of the stomach is exercised exclusively upon albuminoids; carbo-hydrates and fat being untouched. The solvent action of the gastric juice in breaking up muscular fibrillæ and vegetable matter, is greatly aided by the movements of the stomach, which roll its contents about. While digestion is proceeding normally, a sense of well-being and comfort is experienced; a matter which has been practically utilized by the Anglo-Saxon, who invites men to a good dinner before asking them to subscribe to any charitable object. So successful has this been found that it is said, "The road to an Englishman's pocket lies through his stomach."

On the other hand, difficult digestion has a malign and untoward effect upon the temper and disposition, and a stomach-ache is perceptible in many of the sentences in Tom Carlyle's writings. A sudden shock will at once arrest the muscular movements and the gastric secretion, producing a feeling as if the stomach and its contents had been changed into a heavy hard substance. Quietude is conductive to good digestion, and an active man should sit or lie down after a good meal—just as his dog does! Animals fill their stomachs and then lie down—not having the ambition of man, or being interested in the absorbing acquisition of wealth.

As digestion proceeds the pyloric ring relaxes and the chyme finds its way into the duodenum. The acidity of the stomach seems to exhaust itself in the digestive act, and the chyme is readily rendered alkaline by the bile. In this alkaline condition albuminoids are readily acted upon by the trypsin of the pancreatic secretion which completes their solution.

Just as we saw that starch is dissolved by hydration, so is an albuminoid. An albuminoid previous to solution is termed a "proteid." When rendered soluble by the digestive act it is called a "peptone." It has been rendered soluble by hydration so that it may pass through the wall of the alimentary canal, and enter the portal vein. But as a soluble peptone would as steadily slip out of the circulation by the kidneys as it finds its way in by the portal venules, it is dehydrated and once more made a proteid in the portal blood. (When this does not take place properly the peptone appears in the urine as "false" albuminuria.)

When the albuminoid matters reach the liver, a certain propor-

tion is elaborated into the serum-albumen of the *liquor sanguinis* for the nutrition of the tissues. But as the framework of the locomotive needs little repair, so the albuminous tissues of the animal body requires little repairing material from day to day. A sufficiency can be found in a dietary far below what is ordinarily eaten by man, and especially civilized men. For fifty years Lewis Cornaro lived in health and strength and vigour on fourteen ounces of food, mostly vegetable, and twelve ounces of light wine daily. I have a suspicion that the said Lewis Cornaro belonged to that stalwart and somewhat corpulent race of man of whom it may be said "that the less they eat and drink the better they are," and who frequently are glycosuric. But allowing for this, it can safely be said that most people gratify their palates by consuming more albuminoid matter daily than their bodies actually require. This surplusage is called the "*luxus consumption.*" What becomes of this *luxus consumption?* It is burnt up, and oxidized in a descending series as tyrosin, leucin, kreatine, kreatinine, passing on to uric acid and urea. It is unnecessary to give the formulæ of these different substances, except uric acid ($C_5H_4N_4O_3$) and urea ($NH_{22}CO$). "The antecedents of the urea in blood are in all probability, partly the kreatin formed in the muscle and elsewhere, partly the leucin formed in the alimentary canal, as well as in various tissues." (M. Foster.)

This is a piece of physiology of which we have as yet but broken lights. It is enough for the present consideration that tissue waste and albuminoid excess are burnt up, (mainly in the liver) into the above-named product, of retrograde albuminoid metamorphosis. And with these excrementitious matters the physician has much to do, especially as years advance. We all know the sensations of well-being produced by a good meal, under the action of a competent digestion; sensations which have ever had a potent attraction for the Anglo-Saxon race, with whom *dum vivimus vivamus* has been largely a rule of conduct. But when the digestion of albuminoids is not properly performed, then the case is widely different. Dr. Lauder Brunton, F.R.S., has shown that peptones in the general circulation act as a depressant poison; and when the liver is deranged toxic mal-products of "liver stuffs" are formed which render the individual wretched, miserable, and ill at ease.

A well-known lady novelist gave me a very vivid account one day of the effect of a meal upon her. At first she had the wonted sense of well-being, but about two hours after the meal this gave way to a totally opposite condition of depression and sense of misery and

impending evil. This condition is not uncommon, the "liver stuffs" or mal-products of deranged hepatic action having the opposite effects of the normal products of digestion.

The question may now be put: "How is it that nearly all of us eat too much meat, or its equivalent and yet only a certain proportion suffer, as being bilious or gouty?" The question is a pertinent one. The liver possesses a good deal of "spare power" as the late Dr. Murchison happily phrased it, and is, usually, equal to dealing successfully with a quantity of albuminoids, far in excess of the body needs. The answer is then "So long as the liver possesses the power of converting this *luxus consumption* into soluble urea all is well!" Soluble urea passes out of the liquor sanguinis in the renal secretion without any difficulty. But not so uric acid.

Urea belongs to the warm-blooded mammalia with a fluid urine; while uric acid is the form of excrementitious nitrogenised matter in the warm-blooded bird and the cold-blooded reptile. In other words urea belongs to the animal with four chambers to the heart; while the tri-chambered heart is found with uric acid. So long then as the liver can convert the *luxus consumption* into urea so long can man, yes, and woman too, eat albuminoids in excess of their body wants; but when this power wanes, and products belonging to a lower stratum of creatures are formed, then it becomes time to pull up and diminish the nitrogenized elements in the dietary. And if this be not done, gout in some of its Protean forms will show itself. Uric acid is the poison of gout: and when it is formed in any quantity in the body then a condition of lithisis or lithæmia supervenes.

As to the cause of this impairment in the functional power of the liver, it may be said that long continued over-work in dealing with excessive quantities of azotised food is the cause *par excellence*. It may not be the act of the individual but that of an ancestor. The father may indulge in excess, and the son suffer for it in the form of an inefficient liver. "The fathers have eaten sour grapes and the children's teeth are set on edge!" Verily, it is so!

There are, however, other matters of albuminoid descent and lineage, that must not escape our attention; these are the bile acids. Both contain nitrogen; and one contains sulphur—ample proofs of their origin! Glycocholic acid has the formula ($C_{26}H_{45}NO_6$); and taurocholic acid ($C_{26}H_{45}NS_7O$). Some persons suffer from "cholœmia" while others suffer from "lithæmia" when their livers are out of order. Further some persons who are "bilious" in early life lose their biliousness and become "gouty" in middle age. Cholœmia

and lithæmia equally and alike are causally related to the albuminoid elements of our food. Indeed, the products of retrograde nitrogenised metamorphosis are fertile sources of disorder and disease. Dr. George Johnson, F.R.S., has pointed out that kidney disease is set up by hepatic mal-products passing out in the urine and in doing so irritating the kidneys; and has written this trenchant sentence—"*Renal degeneration is a conseqence of the long continued elimination of products of faulty digestion through the 'kidneys.'*"

There can be no doubt in the mind of anyone who has had the opportunity to observe and has availed himself thereof, that when lithates abound in the blood one of two things happen: either some remain in the body as gout; or the kidneys become inured by their output of lithates (the common origin of Bright's disease), or may be more or less of both are found. Many persons pass turbid urine laden with lithates for years apparently none the worse; but all the same their doom is before them. Sooner or later mischief in the kidneys is set up. We pay a price for pleasing our palates!

The effects of food tell us that there are certain properties connected with animal food lacking in other dietetic matters. The herbivora are widely different in disposition and build from the carnivora. The beef of the English soldiers and sailors has played a part in their exploits, it has always been said. Liebig has written—"It is certain that three men, one of whom has had a full meal of beef and bread, the second cheese or saltfish, and the third potatoes, regard a difficulty from entirely different points of view."—Dominie Sampson was another man after some of the contents of the Gipsy's cauldron. Refractory boys of old were subdued by a dietary of bread and water.

Granting all this, it is impossible to disagree with Dr. Pavy in holding that the advantages of a meat dietary have been much exaggerated and overrated. He points to the fact of the oatmeal and milk of the Scotch peasantry. Certain reports of the prison dietaries are referred to by him. Dr. Guy states, "That we possess conclusive evidence of the sufficiency of a diet from which meat is wholly excluded; and even of a diet consisting wholly of vegetable matter." Dr. Pavy is careful to state that he does not advocate a non-meat dietary, but is opposed to the prevalent view that a certain quantity of meat is necessary to vigour; and, the outcome thereof of the principle, that "it is impossible to have too much of a good thing," viz., eating more meat than is either necessary or good for the system.

There is another aspect of meat to be considered, viz., the comparative digestibility of the various forms of flesh which must be dis-

cussed at some length in a future chapter dealing with indigestion. Dr. Pavy has given us a reason for the taste for meat, to the effect that the stomach is the seat of its digestion, and that meat stays long in the stomach before leaving it. Certainly in the case of Alexis St. Martin, a Canadian soldier in the U. S.A. army, whose stomach was laid open by a charge of duck shot, at the distance of one yard, at Michillimackinac in 1822, and who survived the wound, this was the case. For some months the patient suffered terribly from exfoliation of the ribs, etc., but thanks to an iron constitution he rode out the storm. In a year the injury had healed, except that the stomach wound did not close, and he had to wear a bandage over the wound to prevent his food from escaping out of the stomach. A little later a fold of the lining of the stomach developed into a valve which closed the orifice, preventing the escape of the contents of their viscus, but readily pushed inwards by the finger, and so admitting a view of what was going on in the stomach. Dr. Beaumont, his medical attendant, paid him the most scrupulous attention; and in return St. Martin permitted him opportunities for inspecting his stomach when in action. The case created an immense attention at the time, but is now disappearing from our literature. Dr. Beaumont found that beef, mutton and pork took three hours for their digestion in the stomach of St. Martin, and cheese three and a half; but for the latter a much longer time would be required with some stomachs. His broad results were that the flesh of animals is not quickly digested. His conclusions remind me of the hearty eater who after an ample fish dinner remarked that "he felt quite ready for a beefsteak."

Of albuminoid food, and especially the flesh of animals, "fish, flesh and fowl," it may be said that it is agreeable to the palate and grateful to the stomach; and further that it is excellent material on which the cook can exercise his skill, and consequently, that it is a tempting viand; that it is a stimulant in its character and is therefore specially suited for those who lead a life of great physical activity. But that it is not suited for those who lead an indolent or sedentary life; and that most of the maladies which fasten on the body as age approaches are causally linked with the presence of an excess of albuminoid waste in the blood.

Fats.—The third great element of our food is fat. It contains far more carbon and much less oxygen than the carbo-hydrates. It has the formula ($C_{10}H_{18}O$.) Fat can hardly be said to consist of, but rather can be broken up into, a fatty acid and glycerine. The

fatty acids are three, stearic, palmitic, and oleic. Stearine is the firmest fat, readily going solid at a low temperature, while oleine is still quite fluid; and palmitis stands between the two. The matter is readily seen in a bottle of olive oil in cold weather. Animal fat contains a larger proportion of stearine, and mutton and beef suet quickly go hard. Broadly speaking, the digestibility of a fat is linked with the proportion of stearine it contains, and with the temperature at which the fat goes firm. Thus beef and mutton suet are less digestible than butter or lard; while the best cod-liver oil has its stearine removed by freezing.

Fat is derived from animals and vegetables, both as fats and oils. Whale oil is too rank for food, at least for ordinary men; though the Eskimo revel in the blubber of the whale and the seal. Cod-liver oil is not attractive to the palate, though some persons overcome their dislike to it, until they take it readily; and a small number even profess to like it. Palm oil when fresh is palatable, and is freely eaten by the negroes of New Guinea. The oil of the African ground nut is a very thin oil, used to thin down and to adulterate other oils. Olive oil is used in cooking, as frying fish, and for salads; but there are reasons to believe that rape-seed oil is largely sold as salad oil. Many seeds are rich in oil, as linseed; while some nuts abound in oil. The cocoa-nut and the Brazilian nut of commerce are instances in point. Why such quantities of a concentrated hydrocarbon should be requisite in the case of certain seeds in tropical climates it is not easy to see. Nor is the passionate liking for fat as seen in the Hindoo's much-prized ghee and the equatorial negro's fondness for palm oil as readily intelligible as is the Eskimo's preference for blubber, which is shared by the Yakoots of Northern Asia.

Fat is a very concentrated fuel-food, and is the form of storage of surplus food, chiefly derived from the carbo-hydrates. The hybernating animals retire laden with fat, and emerge from their hiding-places, gaunt and emaciated like the pig buried under the chalk cliff of Dover, which Dr. Mantell has made famous. His sty was a cave in the solid rock, under a chalk cliff; so that when a large portion of the cliff fell, he was buried alive. He was estimated to weigh about 160 lbs. when the accident occurred; of course no hope of his survival was entertained, but 140 days later the workmen removing the débris heard him whine, and got him out alive: but only weighing 40 lbs. No doubt he must have perished but for the moisture which exuded from the rocky sides of his cave. During this long period piggy lived on his own fat. The Tyrolese chamois hunter

has found by experience that a piece of beef suet is the best and least cumbrous food he can carry with him on to the mountains. His choice is a wise one.

Fat is not affected by salivary nor yet by gastric digestion. It is only when gastric digestion is over, and fat comes into contact with bile and the pancreatic secretion, that any change is effected in it. The change is not molecular like the hydration of carbo-hydrates and albuminoids; but is merely an emulsification, *i.e.*, a division into minute particles. These fine particles are small enough to enter the mouths of the lacteals in the intestinal villi, which may be said to "eat" the fat globules. From thence the emulsionised fat passes on to the lymphatics. The history of fat in the body after this is obscure; we know that some of it is taken by the tissues, and the rest is burnt up as body fuel. There is no proof of fat being stored up in the body as fat. Indeed, Ebstein has advocated the substitution of fat for carbo-hydrates in the treatment of obesity; and that too with success.

The difficulty with fat lies with the stomach. A delicate fastidious stomach is offended by the presence of fat in it; and this re-acts upon the palate. Some stomachs will tolerate cold butter, which promptly and pronouncedly take offence at warm fat. Rancid fat is objectionable to all civilized stomachs; and compels the most scrupulous attention to all culinary utensils. With some persons, fat turns rancid in the stomach by the formation of an acrid acid,—butyric—causing heart-burn. There is a growing dislike to fat, especially animal fat, at the present time. Many children will no more eat fat than will the cat. They will turn with loathing from the sweet pieces of fat on their plates, yet they will readily swallow the fishy cod-liver oil. Their choice is instinctive, and evidently linked with the fact that they can digest the one, but *not* the other. The fact remains; and Dr. King Chambers tells the story of a phthisical Scotch terrier who whined at the door of the cupboard in which his cod-liver oil was kept, if it was forgotten.

The late Prof. J. Hughes Bennett of Edinburgh first introduced the use of cod-liver oil into the treatment of phthisis. There is nothing magical about it, it is merely the most digestible form of fat. Still, it is a mighty matter in dealing with wasting disease. The defective tissues of stroma improve under it. The phthisical patient frequently finds in it the means of staying his disease. Taken about an hour and a half after meals it quickly passes out of the stomach, and so gives that viscus little offence. Taken before a meal, or even

immediately after, it eructates and disagrees. But taken at the time when the disintegrated food is passing out of the stomach, it quickly reaches the point when fat is dealt with in the alimentary canal. But in some cases, especially when the bowels are the seat of tubercular disease, the oil is voided *en masse* and unchanged. Here the pancreas is clearly unequal to dealing with it; and it is useless to persist with it.

From the fact that fat is emulsionised in the intestines, chemists have been led to imitate nature, and form fat emulsions. In milk, fat exists in the form of an emulsion; and the addition of a certain amount of milk to the dietary provides fat for healthy tissue formation, in persons with the most tetchy stomachs. Or cream with a little flavouring like maraschino, may be taken about an hour after a meal. By so doing in many cases it does not become necessary to resort to cod-liver oil. Fat emulsions are more digestible, or rather assimilable than unemulsionised fats and oils. There are many fat emulsions in the market, of varying value, and various flavours. Hydroleine and oleochyle are cases in point. But there is a difficulty in keeping them, as sooner or later the emulsion separates. One specimen I had for three years before it began to part; but for sundry reasons I have no intention of giving its owner a gratuitous advertisement by mentioning it here. In other cases the oil has been mixed with malt extract; and though this gives an emulsion of coarse oil-globules, in time the oil gets to the top. Then in the Cremor Hordeatus of Leoflund the emulsion form of fat is preserved; and Oleobyne is an emulsionised fat. These last contain fat with soluble carbo-hydrates, and are palatable as well as being capable of being kept for any length of time in their tins. Such preparations are indicated where the palate objects to cod-liver oil; indeed the fat in both cases is a better fat than the oil; while the form of emulsion is favourable to assimilation. They form indeed very complete foods for invalids and travellers. With a little farinaceous matter, as a biscuit, and a little milk, they are well adapted to gouty persons and those who suffer from Bright's disease.

Fat-eating among adults is fortunately on the increase at the present day; if the valuable hydro-carbon is in growing disfavour in the nursery. Intelligent persons are now eating fat because they know it is good for them. Whenever there is any tendency to tubercle, the individual should learn to eat fat, just as a seafaring man learns to swim. As a physician to a Chest Hospital I have learned to dread the announcement that fat is no longer taken, es-

pecially if the individual is of strumous build, with a small narrow chest. In my opinion the existence of a considerable area of affected lung where the digestive powers keep up, is less fraught with evil and less prognostically significant than intractable wasting with very little disease in the lung.

The statement often made that "fat is bilious," as being a direct irritant to the liver, is incorrect.

Certain it is that when the dietary is improved in some cases the liver is upset by the new demand upon it; but this can always be met by a cholagogue and a purgative.

Salts.—Certain inorganic principles are also essential to our health, mainly chlorides and phosphates. When certain vegetable salts are lacking in the dietary, the disease known as scurvy is induced. The early navigators of the oceans which lave the shores of the new world were terribly afflicted with scurvy, in consequence of their dietary of biscuit and salted meat. Any vegetable matter, especially "scurvy" grass (cochlearia officinalis) a member of the Cruciferæ, at once brought relief. Land scurvy is occasionally seen in persons who abjure vegetables, as do some dyspeptics. A cruel old Dutch punishment was to feed prisoners on bread made without salt. Much obscurity still overlays the functions of these body-salts. "We know that the various saline bodies are essential to health, that when they are not present in proper proportions, nutrition is affected, as is shown by certain forms of scurvy; we are aware of the peculiar dependence of proteid qualities in the presence of salines; but beyond this we know very little." (M. Foster.) A good illustration of the value of the body-salts is furnished by watching the effects of arresting the night sweats of phthisis. As soon as the outpouring of the salts in the sweat is checked, the appetite returns and soon the pallor of the features gives way to the hue of returning health. The effect is often almost magical. Chloride of sodium, our common salt, is a palatable addition to our viands and especially to the flesh of animals. Probably from it is furnished the hydrochloric acid of the gastric juice; while the soda goes to the liver, as the alkaline base of the glycocholates and taurocholates of the bile. The phosphates too are equally important. Phosphate of lime is requisite for the bones of the body, and is furnished by the cereals of our own food, and in milk. "Caseine is a nitrogenous principle which is conspicuous for the tenacity with which it holds a large quantity of phosphate of lime incorporated with it." (Pavy.)

It is found indeed in all the structural elements of the body.

Lecithin, the food of the nervous system, is a phosphorescent fat. Then potash is requisite for the muscles, and red corpuscles of the blood. Why there should be phosphates and potash in the blood-corpuscles with chlorides and soda in the plasma around, we do not yet know. Indeed, this is part of the darkness undispelled as to the body-salts. "Although so closely allied in their chemical properties, potash and soda cannot be made to replace each other in the living system, and the same is likewise true of lime and magnesia." (Pavy.)

Whatever the peculiar part played by saline matters in the body, we know their importance, by the consequences of being without them. The phosphates, the chlorides, lime, soda and potash, are essential to health and life.

Water.—Water undergoes no change in the body, nevertheless it is a most important matter. Solution is an essential part of digestion. Our tissues are bathed in fluid; our secretions flow. If hunger secures the taking of food, a still more imperative sensation provides for the necessary fluids. Thirst is the security for our supplying our tissues with a sufficiency of water. When cut off from food and drink it is thirst which drives the sufferer delirious, and shortly closes the scene by death. Hunger kills more slowly. Water is even more essential to life than food itself. Water too, bathes the tissues and washes away our waste and excrementitious matter. The vascular system, like the canals of Venice, provide the food and take away the waste and offal. Water has, too, other properties in the body.

"Water does not itself undergo any chemical alteration, and hence is not susceptible of liberating force—does not in other words, constitute a force-producing agent, but it contributes to chemical changes by supplying a necessary condition for its occurrence in other bodies." (Pavy.)

CHAPTER III.

METHODS OF PREPARING FOOD.

In the preparation of food of yore, the palate has no doubt been the great guide. Still, a blind instinct seems also to have been at work. The cook has been led to prepare vegetables with meat; to unite grain and milk; to boil the highly nitrogenised beans with fat bacon; or peas and pork. Experience at work through countless ages has no doubt instructed Man, albeit darkly, what combinations of foods are requisite for health under certain conditions. Sauer-kraut was a wise provision of vegetable food during the long winter, when salted foods and cereals formed the chief dietary of the people. A Lenten fast of vegetables was a useful hygienic measure for clearing away the maladies incidental to such a dietary; as useful as vegetables to scurvy-stricken crews before the days of lime-juice. No wonder people long ago spoke of the anti-scorbutic properties of certain vegetables.

Before proceeding with the preparation of foods, it may be well to give a Letheby Table of the comparative value of various edible articles as tissue-food and fuel-food, without any pledge as to the absolute accuracy of it. It is certainly useful, as giving a good broad idea of the value of various comestibles:

	CARBON.	NITROGEN.
Fresh Butter,	64.56	—
Dry Bacon,	59.87	.95
Dripping,	54.56	—
Green Bacon,	54.26	.76
Lard,	48.19	—
Suet,	47.10	—
Salt Butter,	45.85	—
Fat Pork,	41.13	1.06
Cocoa,	39.34	1.40
Cheddar Cheese,	33.44	3.06
Indian Meal,	30.16	1.20
Sugar,	29.55	—
Oatmeal,	28.31	1.36
Rice,	27.32	.68
Seconds Flour,	27.00	1.16
Split Peas,	26.99	2.48

	CARBON.	NITROGEN.
Rye Meal,	26.93	.86
Pearl Barley,	26.60	.91
Barley Meal,	25.63	.68
Treacle,	23.95	—
Bakers' Bread,	19.75	.88
Skim Cheese,	19.45	4.83
Mutton,	19.00	1.89
Beef,	18.54	1.84
Red Herrings,	14.35	2.17
Bullocks' Liver,	9.34	2.04
White Fish,	8.71	1.95
Potatoes,	7.69	.22
New Milk	5.99	.44
Parsnips,	5.54	.12
Carrots,	5.08	.14
Skimmed Milk,	4.38	.43
Green Vegetables,	4.20	.14
Turnips,	2.63	.13

In considering the methods of preparing food, it may be well to commence with Meat.

Meat.—*Boiling.*—One of the most ordinary methods of cooking meat is to boil it. Of old a piece of meat, a ball of oatmeal, and possibly some greens, (when they are to be got), were all put into a huge pot, which was then heated. The old Border rule was, "no broth no ball; no ball no beef." That is, first came a basin of broth; then some of the ball; and after that when the edge had been taken off the appetite, the beef. If the broth was not supped, there was no ball; if the ball was not eaten there was no meat to be looked for. In those days, when the broth was of moment, the meat was placed in cold water—about a quart to the pound of meat. "It should be covered with water during the whole of the process of boiling—but not drowned in it—the less water, provided the meat be covered with it, the more savoury will be the broth." From fifteen to twenty minutes for each pound weight is the (Kitchener) time. But freshly killed meat, *i.e.*, while the rigor mortis is on, takes a longer time than meat which has been kept till in culinary phrase it is "ripe." Meat loses (roughly) about 30 per cent. of weight in boiling.

When the "liquor," the fluid in which meat has been boiled is an object then the meat must be put in cold water and all brought to the boil; but when the meat is the first consideration then the water must be boiling when the meat is put in it. "When it is introduced into boiling water, the albumen of the flesh is immediately coagulated on the surface and to a certain depth inwards, thus

forming a skin or shell, which no longer permits the juice of the meat to flow out, nor the water to penetrate into the mass. The flesh continues juicy, and as well flavoured as it can possibly become. The greater part of the savoury constituents is retained in the meat." (Liebig.) Meat so prepared is very much more toothsome than meat placed in cold water.

In boiling fish some prefer to heat the water, and add the different matters as salt and vinegar; then to take the pan off the fire and put the fish into the boiling water allowing it to remain in the water the same time that is given for boiling it. One gentleman who has his fish so "boiled" said the plan worked up to an 18lb. salmon. It is asserted that the flesh is more palatable this way than after ordinary boiling.

Boiled meat puddings are very savoury. The ordinary beefsteak and kidney pudding is well known, but the contents of the paste may vary; in Suffolk pork is substituted for beef; in Oxfordshire liver and bacon are placed in the paste. The best thing to do with an old partridge is to let it hang till it is high and then make a boiled pudding with it, packing some pieces of fat and lean mutton around it.

Custom has settled the choice of joints for boiling and for roasting. In the case of a ham it is well to leave the ham in the fat till the water has gone cold; especially is this desirable where the ham is a dry one. When dried fish is to be boiled it is well to steep it in lime water first. This conserves the phosphoric acid as "bone earth" or phosphate of lime; otherwise the phosphorus would be lost, and with it much of the food value of the fish.

Roasting.—Probably this was the earliest form of cooking meat. The savage could put a piece of meat on a stick and have it kept before the fire. Before the days of the "jack," dogs called "turnspits" were engaged to keep the meat turning before the fire. As well as turning, basting is required to keep the meat from burning. The time for roasting is a little more than for boiling. On the whole roast meat is more savoury than boiled meat. Roasting is a method of dealing with fresh meat; while salted meat is boiled. True to his theory of coagulating the albumen of the meat at the exterior to preserve the juice, Liebig advised that the joint be first placed near the fire, and then after the surface was hardened, to withdraw it a little. Usually however, the obverse is practised and has the sanction of Dr. Kitchener. "The basting ought to be performed like a religious duty. A meat screen or reflector is desirable,

as it saves coal by keeping both sides hot." The fat which exudes is saved as dripping, while the meat juice is sent up as gravy, which gives relish to the vegetables eaten with the meat. As to whether the meat should be raw or well done is a matter upon which tastes differ. When the roast meat is destined to appear on table in cold form only it is well to avoid cutting into it when hot. Liebig's idea of condensing the juice in the meat is correct enough in this respect.

Baking.—The convenience of the oven is a great temptation to its use. It is said meat loses less weight in baking than in any other culinary treatment of it; but what it gains in weight it loses in flavour. Dr. King Chambers says, "No kitchen is complete without an open range. It is impossible to have a properly roasted joint by any other means, as I learned by visiting the private premises of a 'Patent Kitchener' manufacturer; finding there an old fashioned fireplace in full operation. He cared too much for his diet to employ his own works."

An oven, of course, is indispensable to a meat pie. Meat pies bear the reputation of being indigestible, and probably they deserve it, but whether this is due wholly, or only partly to the paste, and meat so treated is not itself indigestible, is a matter not yet determined. The addition of eggs which get as hard as leather may be sound practice from a cook's point of view, but the physician and physiologist can not be expected to be in favour of it.

Broiling.—This is a very savoury way of treating a slice of meat, be it a mutton chop, a beefsteak, or a veal cutlet (which is often fried). Broiling belongs too essentially to the cook's craft to be discussed here.

Frying.—For slices of meat, frying is an abuse except for bacon or ham. It is, however, an admirable way of treating fish, though it may be questioned if a fried herring is equal to one properly broiled or brandered.

The flat fishes are specially adapted for frying, and a fried sole is savoury food. But if the cook's fat be not sufficiently hot it soaks into the fibre of the fish and few edibles are more indigestible than a badly fried sole. With looser-fibred fish this carelessness is less injurious.

Frying is a good plan for heating up cold vegetables, as potatoes, peas pudding, and cabbage, which has much to be said for it from the point of view of the palate and digestion.

Stewing.—This is the most economical method of cooking; it is especially adapted to households where strict economy must be prac-

tised. As Dr. Buckmaster observes, "All and every kind of meat will do for a stew," and "All vegetables may be cut into slices and cooked in a stew, except potatoes." All gristly meat and trimmings with offal, as sheep's trotters and pig's feet, will do for a stew; of course, as he adds, "the better the meat, the better the stew." An Irish stew consists of mutton, potatoes, and onions, and an admirable as well as economical dish it is. Indeed, such compounds of meat and vegetables in a stewpan and well cooked would be most acceptable to most households, but are comparatively neglected in favour of joints. The long action of heat would affect the starch-grains favourably and thoroughly detach the muscular fibrillæ from each other and so prepare the food for the action of the different digestive agents and processes. As ordinarily prepared a stew is deficient in fat. But care and knowledge are requisite for a good stew and also time. "Time" is what all skilled cooks beg for in cooking. Haste in the preparation is the ruin of stews. Curiosity, too, is a drawback; the lid of the stewpan should never be lifted until it has to be taken off. Then the savoury compound is sapid, fragrant and appetising. It is also most digestible—

> "Half subtilized to chyme—the liquid food
> Readiest obeys th' assimilating powers."

This was written long before science came to bear its testimony to the truth contained therein.

Soup.—Soup is alike a means of gratifying the palate of the wealthy gourmand, and feeding the poor in times of famine. A light soup is very suitable food for the sick. Simply, soup is an infusion of meat, flavoured with a little salt and some condiment. At the rich man's table, soup is a very complex affair. It consists of stock (the simple soup)—gelatine, which goes fluid on heating,—often, cream and vegetables of all kinds and sorts; sometimes it is thickened with broken biscuit, as is done in the Channel Islands—and a very nutritious food is soup so constituted.

In some cases, fish is the chief meat constituent. In other cases, legumes take the place of meat, wholly or partly, especially with vegetarians. Like stews, soups, looked at from their food value, are unsatisfactory as being too poor in fat. Whenever cream is used, the objection falls to the ground. Soup precedes other food, and takes the van in a meal, as furnishing material for the formation of gastric juice. A little meat-juice to furnish the pepsin (an albuminoid body) and a little dextrine for the lactic acid, and then the

stomach brews its own peptic solvent, while the viscus is filled and the palate gratified. The French invariably take a glass of wine after the plate of soup, *"le coup d'après."* Indeed, many soups contain some wine. Old cooks over-season soups, which should not be too highly seasoned—in order not to deaden or dull the gustatory nerve-fibrils. Really, the soup should just be seasoned sufficiently to stimulate the palate. Nor is it good for the lining of the mouth if the soup be served up scalding hot. On the other hand, cold soup is very unpalatable. The meat of which the stock is made, ought to be pounded and put through a sieve, in order to restore the natural condition and properties, and give the meat infusion a true nutritive value. Then some broken biscuit, or some bread-raspings, or boiled potato put through a sieve, should be added, to supply the farinaceous element or conversion into grape sugar. In some cases, fine sago is used. White soups made with milk, and especially when some cream is added, are very nutritive—as containing a distinct proportion of fat—and very palatable.

Raw Meat—Some physicians have advocated the use of raw meat, scraped or pounded, in certain cases. The advantages of such meat are not obvious to the physiological physician. Indeed, Dr. J. H. Bennett discountenances such practice in these words:—"To give meat raw, however finely chopped, is to forego all the advantages gained by judicious cooking, and to force on the digestive organs double work." (Nutrition in Health and Disease.) Many of the advocates of raw meat have had to deal with hysterical women—a class so totally opposed to rational beings in every way, that it is no matter for surprise that uncooked meat agrees with them. The habit of eating uncooked meat has subjected those who indulge therein to trichinosis; and other entozoa are common in Eastern Europe, where this objectionable practice mainly obtains. Meat juice and cold drawn beef-tea have not, at least, this last objection to their use. In milk, we find an albuminous body, which does not require cooking, certainly. Considering that all proteids must be converted into peptones before they can pass from the alimentary canal into the blood, any advantage to be gained from raw meat juice is quite hypothetical; and involves a lack of acquaintance with the physiology of the digestive act on the part of those who resort to such raw meat.

In the cooking of meat, there is no clinical or even molecular change involved in the proteid material. The muscular fibrillæ are loosened by the action of heat, while the coagulation of the albumen

renders the fibres more brittle. Consequently, cooked meat is more easily masticated than raw meat. While the further disintegration of the flesh is facilitated by this change;—and disintegration precedes solution in the digestive act.

Starch.—*Bread Making.*—Starch is the characteristic element in bread, "the staff of life." When wheat was first bruised in a quern, a species of mortar, or ground by the "two women sitting at the mill," all the elements of the seed were in the flour. Long before chemistry could tell them the folly of what they were doing, cooks, led by the eye, began to prefer white bread. In order to attain this end the miller devised means to remove the external coat of wheat as bran. Unfortunately in this external layer lies the bulk of the salts in wheat. By this fateful gratification of the eye a cruel wrong was inflicted upon the young and growing creatures. An erroneous taste dies hard, and the attempts to induce the proletariat to adopt whole meal bread have met with little, very little success as yet. Those who adopt whole meal bread have usually passed the growing age.

Flour, as now made, is far inferior to that of earlier days. The destiny of flour is the oven. Some of it may go another gate, but the bulk goes to the oven. Mixed with water, a little salt and yeast, flour is worked into dough, is set before the fire to rise; after which in loaves it is placed in the oven to be baked. Yeast is a fermenting agent (a form of lowly plant life—yeast fungus). "The presence of yeast in a substance containing sugar, or starch, which is convertible into sugar, and nitrogenised matter, induces certain chemical changes, comprehended under the term vinous alcoholic fermentation. These changes in the making of bread consist in the conversion of the sugar of the flour into *alcohol* and *carbonic gas*; the latter in its efforts to escape from the dough in which it is mixed, distends it, forming vesicular spaces in its interior, and so causing it to become porous or light. Much of the alcohol is dissipated in the process of baking.* During the baking, part of the starch undoubtedly is converted into dextrine (A. Hill Hassall). Thus we see that some insoluble starch is converted into soluble dextrine by the process of baking. The bread is in the oven about one hour and three quarters, and the temperature of the oven is from 450° to 500° Fahr. If bread could be exposed to a higher temperature and be

* This will be welcome news to the out-and-out teetotaller, who otherwise might be led to exclude bread from his dietary.

kept in the oven a longer time without burning, the conversion of the starch into dextrine would be more extensive and complete.

From its vesicular or spongy condition bread is readily masticated and mixed with saliva in the mouth. For delicate children, in whom the saliva is deficient in quantity, or in quality, some guiding principle led shrewd persons to use only the crust of the loaf, which contains more dextrine than the crumb. This was a wise choice. Then came the preparation of rusks and tops-and-bottoms. Finally came "baby foods," of all kinds, a matter to be discussed further on. The principle underlying all "baby foods" is the conversion of insoluble starch into soluble matters. Newly made bread is a poison to most dyspeptics. It is moist and readily goes into a lump in the mouth; while stale bread is drier and of firmer consistency, and does not readily lose its vesicular character in the mouth. Hot breakfast rolls are toothsome but not digestible.

The reason why boiled paste is indigestible with many persons is that it is not vesicular, but a solid mass. When flour has been mixed with fat, as lard or butter, as is done in making pastry, the starch and fat are so intimately mixed and incorporated that the saliva cannot get at the starch granules. Further, too, disintegration is not so easily performed as with bread, and between the two the stomach is handicapped with masses of unchanged starch and fat, upon neither of which has it any solvent action. No wonder then that it aches!

As the confectioners' wares consist largely of flour and fat, well kneaded into paste, they are shunned by the parents and guardians of children of tender years, from the ulterior consequences of eating them. Not only do these masses offend the stomach but they load the bowels; except when their irritant presence sets up diarrhœa for their removal.

The inhabitants of the United States are reputed a dyspeptic race; and certainly a number of representatives of the great Republic have found their way into my consulting room, suffering from indigestion. In the absence of personal acquaintance with the New World I am driven to rely upon what I hear, and upon American cookery books. In reading the instructions as to the making of "corn bread," I find "Bake quickly and steadily in a buttered mould. Less than half an hour will usually suffice." This is not long for the action of heat upon starch. Then it is told me these cakes are eaten quickly. Very little time for the saliva to act upon the starch. In the name of common sense can we wonder if the

outraged stomach sometimes protests? Hampered with immense quantities of unchanged starch it cannot perform its work without effort.*

If corn bread or cakes were eaten slowly much of the resultant dyspepsia would be avoided. The albumen of maize or Indian corn is not gluten. Consequently it will not alone make bread. The combination of maize flour with wheat flour is what is required for a readily digestible bread. All boiled paste, all boiled puddings like a suet dumpling, or a meat pudding-paste, should consist of a union of the two kinds of flour. All baked puddings should be made of the two, especially when eggs are used. Wheat flour and eggs form a compound not easily disintegrated, however palatable. Certainly paste should contain the largest practicable proportion of maize flour. If the medical profession were only generally famiilar with the properties of gluten they could give a direction to the dietary of the nursery of a desirable kind.

In the North of England cakes of all kinds are in vogue, and the frying-pan and the "girdle," or griddle is in constant request as well as the oven. One form of cake is disappearing. When an addition was made to the family group, a cake was prepared by adding plenty of butter to some flour, throwing in a few currants, rolling the paste about a quarter of an inch stick, and placing this in the frying-pan if the oven was not available. While cooking it was divided into squares about the size of the palm of the hand. When cooked it was still a sodden mass, but toothsome. The little squares were then split and butter added freely to the warm cake. Old-fashioned doctors liked this cake, and drank it down with tea (said to have been "laced" with rum) to prepare them for the journey home. It is dying out, probably because the less potent digestive organs of the present generation cannot deal with it. Paste rolled out thin in a circle, with jam or fruit laid over one half, while the other half is folded over, and the edges closely pinched together, is a common cake, or pastry in the North. Then there are Eccles cakes, and Banbury cakes, combinations of flour, fat, currants and candied peel. The early emigrants to New England took their taste for cakes over with them; and sundry rolling-pins were in the hold of the "May Flower," we may depend upon it. The bane of all these comestibles is their indigestibility on account of their forming solid masses in the mouth, which will not fall to pieces in the stomach. Still such

* Of course this is not the sole cause of indigestion in the U. S. A.

cakes are tempting to the palate, especially in early years. A story is told of a little girl who wanted more cake. "She was told if she ate any more she would be ill, and the doctor must be sent for." This effective deterrent on all ordinary occasions failed in this emergency—"Just anozzer piece, and then send for the doctor," she pleaded. Fat and flour sweetened form a good food from a chemical point of view, but the resultant product is unfortunately not digestible; nor are flour and eggs as in sponge cakes much better. The addition of maize flour to wheat flour gets rid of some of the difficulties of pastry; but not of all of them.

Starch of various kinds is in use for milk-puddings. For children, invalids, and dyspeptics such milk-puddings are admirable. unfortunately dyspeptics usually abhor them; a milk-pudding is usually allowed an hour in the oven so that the time for the action of heat upon the starch allowed is double that of cakes. The combination of starch and milk is capital food. Unfortunately the cook will add eggs, which increases the food value doubtless, but detracts considerably from the digestibility. The addition of butter is good. If the various forms of starch, as sago, rice, tapioca, etc., were subjected to heat before being added to the milk the conversion of starch would be greatly facilitated. Acting on this principle, I have taught my cook to put the farinaceous matter in a little pie dish in the oven, dry, and bake it for an hour or two, taking care not to scorch it by having the oven too hot. This does not impair either sightliness or the flavour of the starchy matter. The conversion of starch is proved both by the iodine test, and by artificial digestion either with malt or a malt-extract. The most perfectly digestible milk-pudding is made by adding some ground malt to the baked starch, when the warm milk is poured on, and stirring the whole together, after that setting it in a warm place for ten minutes before putting in the oven. The diastase of the malt acts upon the cracked and changed starch granules, and the resultant product is fit for the weakest baby, invalid, or dyspeptic. Indeed, ground malt is a much better addition than cane sugar wherever such sweet milk puddings turn acid in a fastidious stomach. (There is however one point on which the cook must be put upon her guard, *i.e.*, not to add any ordinary sugar to a pudding containing malt. It is sweet enough with the maltose sugar. Especially is this caution to be observed in those cases where ordinary milk-puddings sweetened with sugar turn sour in the stomach.) Indeed, ground malt alone with a little milk makes a very nice pudding, and is improved by an egg.

The principle of employing farinaceous matter which has already been subjected to heat (so that a considerable conversion of starch has gone on before the human salivary diastase comes into play), is carried out in practice in the form of bread and butter pudding. Slices of stale bread buttered are placed in a dish, some currants are thrown in, and then some sweetened milk poured over all; and the dish is placed in the oven; or bread is crumbed and milk added; but this pudding lacks the fat of the first form. Or a milk-pudding can be made of broken captain's-biscuit (which is baked at a high temperature). The substitution of malt for cane sugar, as described above, is all that is required for an ideally digestible dish for delicate stomachs; the flavour of maltose being also finer than that of cane sugar.

When milk puddings are served at table as a rule they lack fat. If hot it is well to place a knob of butter in the middle of the mass of pudding on each plate; it will melt before the pudding is cool enough to eat, and mixes readily. Very fastidious personages would perhaps say that such a practice is "messy," and object to "making mortar," but these objections do not outweigh the real value of the addition of the butter. If cold, like creeled rice, it is well to eat butter and sugar, rather than sugar alone, to the cooked farina.

The Potato.—The potato lies midway betwixt starch and vegetables. It is a vegetable rich in starch; and boiled potatoes mashed have been used as an adulterant—well, hardly that—to flour in preparing dough for bread. The object of cooking a potato is to transform it from a firm indigestible vegetable into a ball of flour. About the cooking of a potato opinions differ. Some boil, some steam, some pour off the first water; some pour off the water when boiling is completed, and leave the potatoes a little time in the pan. Before the potato disease in the Irish famine of 1846, potatoes were commonly boiled in their "jackets," or skins. When boiled it was enough to take the potato in both hands, and with a gentle pull off came each half of the peel, and the floury ball dropped into the dish. Hard potato is utterly indigestible, and potatoes cannot, like other vegetables, be used to stew with meat. Mashed potato is unobjectionable. The cooked potato is beaten up and mixed with cream, or hot butter and milk, until a light white product is obtained which is most palatable if well made; as such it can be eaten to meat, and mashed potatoes and sausage are familiar in all towns, as eating-house lunches; or a wall of mashed potatoes is made for hashed

meat, or a cottage pie. Mashed potato with salt and pepper and set before the fire to brown, with a glass of milk, forms an ideal luncheon, according to King Chambers. The introduction of the potato revolutionised the fare of Europe in winter. Sauer kraut the Germans had; and pickled gherkins were common over the most of Europe, and in Southern climes some greens were possible; onions too they had; but, after all, their winter dietary was deficient in vegetable food, and consequently scurvy, and other scorbutic affections, were rife. The monks cultivated the wild carrot and turnip as luxuries; but these were only for the well-to-do. The potato, which keeps well with a little care, at once supplied the desired vegetable food, and the winter fare of man was no longer without the desirable elements.

Vegetables.—The vegetables in common use are roots and greens, while celery is a stem like rhubarb. In roots as the turnip, carrot, parsnips, beet, mangel-wurzel, also the onion, etc., there are quantities of starch and sugar, while in greens the leaves consist of vegetable parenchyma of low food value but mostly rich in salts. The most common are cabbage, cauliflowers, broccoli, Brussels-sprouts, spinach, lettuce, endive, salsify, and others. Celery is an excellent esculent food. In speaking of the value of alkalies in our food and especially phosphates, Liebig says—"The sure guide of man and animals has taught us how to counteract the deficiency of veal, fish and eggs, in alkalies by the addition of vegetables, potatoes, or salad. Kitchen vegetables, in this point of view, fill up many blanks. The quantities of salts of alkalies and alkaline earths, contained in many of these, excites astonishment. Celery contains from 16 to 20 per cent., common salad 23 to 24 per cent., and cabbage-heads (buds) 10 per cent., of the weight of the dry plant in the form of incombustible salts." Of the value, then, of vegetables, there can be no doubt; nor of the sure-footed instinct which led man in the days of yore to boil vegetables in the pot with his animal matter. The cruciferæ, especially cabbage, however, do not go into this pot, but into one of their own on account of the offensive smell "green-water" possesses.

The cooking of vegetables is a great art; more especially greens. "They are best," says Dr. Kitchener, "when in full season;" "unripe vegetables are as insipid and unwholesome as unripe fruit." "Fresh gathered" is the motto for vegetable products. An orange or a banana in London or New York is a different thing from the same fruit plucked ripe from the tree. Roots, greens and salads are the

same. Potatoes should be dug out of the ground the last possible moment before cooking, to do justice to them. With roots and greens when stale it is well to put them into cold water, which will freshen them up a little. Vegetable matters are succulent and lose water rapidly, which impairs them in every way. They should be plunged in the pot when the water is boiling. They are a ticklish affair to cook. "Raw" vegetables are unpalatable; while if "vegetables are a minute or two too long over the fire, they lose all their beauty and flavour." Fresh vegetables require considerably less time for sufficient cooking than do stale vegetables. The advantage of life in the country is great in the matter of vegetables. If taken fresh, they, however, preserve well in tins.

After being carefully picked, greens should be washed in cold water and then drained, after that boiled with a little salt; when cooked they should be drained well and served hot.

Cabbages, as eaten in London, are an abomination. They should be treated as in Germany and the United States. When boiled, "drain well, chop and stir in a tablespoonful of butter, with pepper and salt." Such cabbage is also good cold; and heated up next day it is excellent. Like soup, cabbage is better the second day than the first. But served as they are in the South of England they are a very poor affair.

In the North of England, in early spring, it is customary to gather the leaves of a wild lettuce with the young shoots of the common nettle and chop them fine, then to mix some pearl barley with them and boil in a bag. This is called a "herb pudding" and it was no doubt a valuable food in old days for scorbutic affections. The "nettle" beer of the Midlands no doubt had a claim to be regarded as anti-scorbutic, especially when hoarhound was added.

Salads.—Uncooked vegetables are usually eaten as salad. The lettuce, the endive, the dandelion, mustard, cress, and watercress alone or mixed, are the main constituents of salad. Cucumber and onion form a savoury salad. Potato salad is not much in use in England. Some like a little sorrel in their salads; others preferring tomatoes. Celery, radishes and watercress are as often as not eaten alone. Some persons prefer to dress their salad on the plate, while others prefer it dressed before it comes to table. As to the dressing the old Spanish proverb ran to this effect, "To make a perfect salad there should be a miser for oil, a spendthrift for vinegar, a wise man for salt, and a madcap to stir and mix all together." In gathering salad, no steel knife should be used. After carefully

picking and washing them, "let them remain a while in the colander to drain; lastly, swing them gently in a clean napkin," then place them in the salad dish and prepare the dressing, and "pour it down the side of the salad dish—and don't stir it up till the mouths are ready for it." So says Dr. Kitchener, who adds—"We recommend the eaters to be mindful of the duty of mastication—without the due performance of which all undressed vegetables are troublesome company for the principal viscera, and some are even dangerously indigestible." Beetroot boiled in slices is commonly added and makes the dish look well. Then cold meat is often added. The Italians used cold chicken; the Dutch, cold boiled turbot or lobster, and in spring, young onions.

As to salad dressing, it can be bought, but it is well to make it, when and as wanted.

The following is Sydney Smith's recipe for it.

"Two boiled potatoes strained through a kitchen sieve,
Softness and smoothness to the salad give;
Of mordant mustard take a single spoon—
Distrust the condiment that bites too soon;
Yet deem it not, thou man of taste, a fault,
To add a double quantity of salt.
Four times the spoon with oil of Lucca crown,
And twice with vinegar procured from town.
True taste requires it, and your poet begs
The pounded yellow of two hard-boiled eggs.
Let onion's atoms lurk within the bowl
And scarce suspected animate the whole;
And lastly in the flavored compound toss
A magic spoonful of anchovy sauce!"

It will be seen that he is not at one with the Spanish proverb as to the proportions of oil and vinegar. He makes no mention of sugar, which is indispensable in a salad in which there is sorrel. Then the French have very compound salads, and add black pepper, chervil, and sometimes a scrap of cheese. Even the dissolving the salt in the oil rather than the vinegar is insisted upon by some gourmands. There can be no doubt that the addition of a few drops of Worcester Sauce is good. Carminatives are desirable in salads, for vegetables are "windy." It is needless to say that salads are unsuitable for dyspeptics and those who possess tender bowels.

As a wholesome article of diet, salads are too much neglected in many households, where they might be adopted with advantage.

Fruit.—Fruits are part of the food of man, and in some areas a

very large factor in the dietary. They are very wholesome, though in some country districts, fruit is regarded as unwholesome and tending to set up diarrhœa. Certainly, if a child is debarred from access to fruit, it will take the earliest opportunity of gorging itself on any fruit which presents itself; and not be very particular or select about the quality either. If the fruit be unwholesome—either unripe or over-ripe, the best thing that can happen is for the alimentary canal to get rid of it as quickly as possible. But sound, ripe fruit is wholesome and good; and if it formed a part of every meal, children would be pretty safe against indulging in indifferent fruit. Cotton Mather said: "Doubtless God could make a better fruit than a strawberry, but doubtless he had not." Others might prefer a jargonelle pear, or a muscat grape, or a mangoe, while others would prefer the orange. All fruits contain levulose sugar, and usually some acid in varied proportions, ranging from the pineapple to the lime. They all contain alkaline salts, which are good for the blood. "This influence of the alkalies is shown in a decisive manner, in the effects produced on the salts of organic acid in the circulation. It has long been observed that, after eating juicy fruits, cherries, strawberries, apples, etc., the urine becomes alkaline. All these fruits, as well as the juice of edible roots, tubers, and green vegetables, contain these alkalies in the form of salts of the organic acids; usually as malates (all kernel-fruits, pineapple;) citrates, (stone-fruits, currants, potatoes;) tartrates (grapes)." (Liebig.)

The utility of such fruits in the uric acid diathesis is apparent and obvious. If gouty persons would learn to eat fruit and teach their children to follow the example set, it would save much resort to medicine in later days that might well be avoided.

The growth and decay of fruit is thus described by Pavy:—"During its progress, it increases more or less rapidly in bulk and weight; and as it approaches maturity it loses its green color, becomes brown, yellow, or red, and no longer acts on the air like the leaves, but on the contrary, absorbs oxygen and gives off carbonic acid. As this process advances, some of the proximate principles contained in the unripe fruit, particularly the vegetable acids and tannin, in part disappear—apparently by oxidation, and, thus it becomes sour and astringent. At the same time, the starch undergoes transformation into sugar; and the insoluble pectose into pectin, and other soluble substances of allied composition and having more or less of a gelatinous character. The fruit in this way arrives at a state of perfection for eating. Oxidation, however, still advances, and now the

sugar and remaining acid become destroyed, giving rise to the loss of flavour which occurs after the full ripened state has been attained, and deterioration has set in." From this we can readily understand why unripe fruit, as well as over-ripe fruit, is not wholesome and salutary. "The vegetable acids and the pectin disappear in the body speedily after being eaten; while the alkaline base appears in the urine as a carbonate:" though if uric acid be present, as a urate.

Some fruits are preserved by drying them, like the fig, raisin and currant: while others are preserved by boiling them with cane sugar, as guava jelly, strawberry jam, etc., while in the South of France, candied fruits are a large article of manufacture. The addition of the cane sugar in the two latter cases, gives such fruit a tendency to turn acid in the stomach. Of old, fruits were bottled, and now they are tinned extensively; and when so preserved, keep perfectly good for years.

At one time, preserving was a household affair, and preserves were home-made. Now, preserving is a business. The introduction of apple and turnip into marmalade, sent the best firms to Spain for their manufactories. Then raspberry jam was adulterated with the pulp of gooseberries. Dried figs, of indifferent quality, with their seed, offer great temptation to the rascally manufacturer; and when mixed with plums that have seen their best day, and boiled with a cheap glucose (made by boiling starch with sulphuric acid), and finally flavoured with various essences, the resulted product is sold as "Family Jam." Such preserves are used for jam puddings, and are eaten on bread. They have a food value of their own; but are far inferior to butter, for which they are too commonly substituted.

When sugar is boiled with butter, the well-known toffee (a very excellent hydro-carbon), is furnished. The old-fashioned plan of making toffee extensively in cold weather had much to be said for it. It supplied an extra ration in fact, of admirable and concentrated fuel-food, to meet the external cold; while it also supplied fat for healthy tissue-growth. When delicate children object to fat, and their stomachs will not tolerate cod-liver oil, it is no bad practice to encourage them to take toffee. Of course, the mother smiles derisively at the idea; but the results are often very satisfactory. And such union of carbo-hydrates and fat might often be utilized with advantage with delicate children.

Such then, are the various forms of food in common use with man, and their methods of preparation. Their food-value and their digestibility vary widely—not only in the material itself, but also in the methods of preparation.

CHAPTER IV.

CONDIMENTS.—SAUCES.

Condiments.—Condiments can be regarded from two distinct and different points of view, viz.: one, hygienic, and the other gastronomic. Salt is an excellent addition to our food, and in some parts of the world where it is scarce, as in Central Africa, the saying for a rich man is—"He eats salt with his food." Animals will often go long journeys in search of salt; and the buffalo made periodic excursions to the "salt-licks." Man is rarely deprived of salt; but animals frequently are from ignorance or neglect of the subject. I have read somewhere (though I cannot lay my hand upon the statement), that the hamster which lays up large stores of provisions for winter, gathers amongst the rest some leaves of the gentian and the century, to give flavour to its food; the bitters no doubt acting upon the appetite. Certain agents, as carminatives, have a good effect as reducing flatulence, and in India some birds are said to pick fruits and seeds containing aromatic oils to meet some craving; just as the Hindoo adds curry to his rice. When the dietary consists largely of vegetables, carminatives are specially indicated, particularly pepper. And vegetarians find that carminatives are essential, as Dr. Kitchener says, to comfort.

Mustard is mainly eaten with meat; except when added to a salad. Pepper, the Romans valued so highly that they exchanged gold for it, weight for weight. Indeed so much pepper formed part of the ransom of Rome when besieged by Alaric. Cayenne pepper is still more potent and pungent, and has to be used sparingly. Of old it was common for persons suffering from flatulence, to make little pills of Cayenne pepper and bread crumbs, and swallow them at table. Ginger is another excellent condiment, either added to a pudding, or eaten in powder as is customary with melon. Essential oils have the same effect in relieving flatulence.

The right use of condiments and their true proportion and combination has formed a great part of the cook's art at all times. It formed what is called a "relish," and the pauper will be found

eating a red herring with his frugal meal of potatoes—"to give them a relish." So an anchovy is added to a beefsteak.

> "The spirit of each dish and ZEST of all
> "Is what ingenious cooks the *Relish* call."

And the condiments should be added in the act of cooking. If pepper be wanting in a beefsteak-pie or pudding, to add it after serving is a poor substitute for the real article. Some persons prefer highly seasoned dishes; and as a broad rule it may be said the taste for condiments grows with years. Children rarely care for highly seasoned dishes. Also as the palate flags, condiments and sauces are more in request; and this is specially true of gourmands in hot climates. The curry of the East Indies finds its correlative in "the pepper pot" of the West Indies. Pavy says of them—"Through their aromatic and pungent qualities they also assist digestion; the *modus operandi* being by promoting the flow of secretion and increasing the muscular activity of the alimentary canal. In some cases they may be further useful by serving to correct injurious properties that may belong to an article of food." They are of various kinds. Pickles are eaten with cold meat, especially when fat. Some are added to other food as a flavouring agent, as the onion, or garlic. Many as vanilla, lemon, almond, ginger, and nutmeg are used with milk puddings. Not only do they gratify the palate, but they serve a useful purpose otherwise.

Sauces.—Sauces are combinations of condiments, more or less complex. Some, as anchovy sauce, are used to add to or bring out the flavour where this is latent or little, as in boiled white fish. Some sauces are made of various ingredients, as with roast duck for instance, it is common to make a sauce by stewing the giblets, chopped fine, and mixed with the gravy in the dripping pan, and to this some finely chopped chalot is added. Such is a savory sauce. To some sauces wine is regarded as a good addition. *De gustibus non disputandum,* but a little plain gravy is nicer with meat and vegetables than an elaborately made sauce including port wine,—to my mind! Sweet sauces are used to puddings; and rum sauce was once in great favour.

Then there are prepared sauces. Catsup is an old favourite. So is India soy. Many and varied are the sauces and relishes now manufactured and sold. Harvey's was one of the first. As an all-round sauce Lea and Perrin's Worcester Sauce, "made from an old recipe in a nobleman's kitchen," is as good as any. It is said its peculiar

flavour is due to a certain admixture of asafœtida; the exact amount constituting the secret. Of old, the flavouring agent was added to the ragout; but now various sauces are placed upon the table, and each guest flavours for himself. There is no broad rule like that of mustard with beef and pork; while it is never eaten with mutton and scarcely with bacon or ham. No one dreams of eating mustard with boiled chicken, or forgetting it with roast goose.

Condiments are curiously omitted from the dietary of invalids. There is a general impression that the plainer the food for them the better. But this leads to a terrible monotony in the dietary. Salt is often forgotten in the meat broths of the acutely sick; and a little Worcester, or allied sauce often gives a zest to a palate which has been palled by plain beef tea. If condiments do not possess a true food-value, they are not without a value of their own; and are not matters to be neglected in dietetics. Of chloride of sodium or common salt, its utility is easily recognized; though its *rôle* in the animal economy is not quite as clear as could be wished. Boussingault made experiments upon oxen, by giving salt to some, while withholding it from others, which told unmistakably of its value. As to the food value of vinegar, it is not easy to find anything positive. No doubt it is changed and oxidised in the body; and that it is agreeable to the palate as an addition to many articles of food; but beyond that it has a further utility. "It seems not improbable that as vinegar powerfully excites the secretion of the salivary glands, it exerts a similar influence upon the stomach, augmenting the flow of gastric juice, and thereby increasing the digestive power of the organs." (Stille.) Of its evil effects when taken to excess—as is done by some persons for the reduction of obesity—there is no question.

Condiments are agreeable to the palate, and, in moderation, good for the digestive organs.

CHAPTER V.

BEVERAGES.

Water.—As well as food, animals require drink; indeed the necessity for the latter is the more imperative of the two. Our bodies largely consist of water; and our secretions daily entail a considerable quantity of fluid: while for excretion a certain bulk of water is essential. Our tissues indeed, are bathed in fluids which at once bring nutriment, and carry away waste matters. The good effects of watering places are largely due to the increase in the bulk of fluid taken there, irrespective of any special quality of the water. Especially is this seen in the case of ladies, who, as a rule, habitually take too small quantities of fluids—for obvious social reasons. Further there is an impression abroad, that it is undesirable to dilute too freely the gastric juice. On this matter Pavy says, "Whether, as the result of the influence of this notion upon the public mind, or not, mischief is frequently occasioned, especially among the higher ranks of society, by a too limited consumption of fluids. Instead of taking a draught of some innocent and simple beverage, it is at many tables the fashion to sip fluid—and this a more or less strongly alcoholic one—only from the wineglass. It is a mistaken notion to think that when we drink with a meal, we are diluting the gastric juice. The act of secretion is excited by the arrival of the meal in the stomach, and the gastric juice is not there at the time of ingestion. It happens, indeed, that the absorption of fluid takes place with great activity, and the liquid which is drunk during a meal, becoming absorbed, may be looked upon as proving advantageous by afterwards contributing to yield the gastric juice which is required." So much for the dilution of the gastric juice. Then there is the question of excretion. Urates especially are sparingly soluble, and require a certain amount of dilution for their removal. Gouty ladies certainly drink far too little fluid, and more water is unquestionably desirable in their case; and if the water contain some alkaline matter it will be all the better for it. But whether alkaline waters should be drunk at meals or not, is a matter on which opinions may differ. The digestion in the stomach goes on in an acid

medium; and too much alkali certainly seems contra-indicated. On the other hand a draught of such water half an hour before a meal is certainly desirable. To provide an alkaline bath for the tissues is an excellent practice, especially first thing in the morning when getting out of bed. But it is also well to take a second similar draught before a late dinner. That is one aspect of the subject.

There is, however, another. Sidney Ringer, in discussing alkalies, speaks as follows: "We wish to draw attention in this place to one important property of alkalies—namely, their power to increase the secretion of the gastric juice—itself an *acid* secretion. We venture to think many facts warrant the following generalization:—that alkalies applied to the orifices of glands with acid secretions increase their secreting power; while alkalies applied in a corresponding way to glands with alkaline secretions lessen or check the secretion." It is good, then, to take alkaline fluids before a meal in order to increase the flow of gastric juice as well as to wash away waste matters from the tissues.

How far draughts of iced water at meals are injurious, either to the stomach itself, or to the digestive process, is a mooted point. Iced fluids have ever been sought for in hot climates, and are certainly agreeable to the palate. About that there is no doubt or question. The Austrians love iced beer to their meals; nor do they suffer from indigestion therefrom; especially the female element. How far the dyspepsia of Americans is due to their free use of iced waters, is a matter on which some persons are insistent; but I am not in a position to give an authoritative opinion on the subject. There are certainly other factors in operation in their case.

The amount of fluid required daily, is stated to be about five pints, to meet the water-loss by the kidneys, the skin, and the lungs. The gastric juice requires fluid. The bile secreted, the pancreatic flow, and the saliva all involve a considerable bulk of water. Beyond the matter of dilution of secretions and flushing of excretions, there are the relations of water to the body temperature. The cooling effect of water passing from the fluid form to that of vapour is the means of keeping down the body temperature; which otherwise would rise to a point incompatible, not with capacity for exertion—but with life itself. Dogs which do not perspire properly die in hot climates. Where there is great exhalation of water, drink is imperative; whether it be in the tropics or the heat of iron-works, or stoke holes. The workers in founderies, and iron factories, and stokers, measure their drink by the gallon. But taking persons of ordinary

life, the amount of fluid taken depends very much upon what it is; whether it is palatable or otherwise,—and whether or not it be charged with alcohol.

Fluids are taken with our meals, and are essential to digestion, and the secretions involved in the digestive act. Beyond that, most fluids chosen for such purposes possess a certain stimulant action. Alcoholic beverages were once the drink of all classes. Now tea, coffee and cocoa have largely taken their place. But the actions of these various stimulant beverages—as stimulants—will engage our attention in the next chapter.

Beverages as food-accessories.—As to the effects of beverages taken with meals upon the digestive processes, Sir William Roberts, F. R. S., of Manchester, has recently made extensive observations. In his address on Therapeutics at the Cardiff meeting of the British Medical Association in July, 1885, he gave the following conclusions, as the result of his enquiry.

"In studying the influence of our food-accessories on digestion, it is necessary to distinguish sharply between their action on the chemical processes, and their action on glandular and muscular activity. These two actions are quite distinct, and generally opposed to each other; for while all the food-accessories were found to exercise a more or less retarding influence on the speed of the chemical process, some, if not all of them, exercise a stimulating influence on the glands which secrete the digestive juices, and on the muscular contractions of the stomach. It is also necessary to distinguish between the effects of the food-accessories on salivary digestion, and their effects on peptic digestion, inasmuch as wide divergencies were found to exist in this respect. The distilled spirits—brandy, whiskey, and gin,—were found to have but a trifling retarding effect on the digestive processes, whether salivary or peptic, in the proportions in which they are commonly used dietetically. Their obstructive effects only become apparent when used in quantities which approach intemperance. Taking this in conjunction with the stimulating action which they exercise on the glands which secrete the digestive juices, and on the muscular activity of the stomach, their effect in these moderate dietetic proportions must be regarded as distinctly promotive of digestion.

"Wine and malt liquors exhibited an action differing considerably from that of ardent spirits Wines were found to be highly inimical to salivary digestion. Even very small quantities of sherry, claret, hock, or champagne, inhibited the action of saliva on

starch to a very high degree. This is due to the considerable acidity which all wines possess. When this acidity was neutralized by the addition of an alkali, the inhibitory effects of wines on starch-digestion was entirely removed. It is a common practice to mix wines—especially sherry, claret, and hock—with soda, seltzer or some other effervescent table waters. These waters all contain a charge of alkaline carbonate, and it was found that, when wines were thus mixed, they ceased to embarrass the salivary action. This practice may therefore be looked on as highly commendable in the case of persons of weak digestion.

"On peptic digestion, wines exhibited a retarding effect altogether out of proportion to the alcohol contained in them. Both the stronger and the lighter wines, except in very moderate proportions, checked the speed of the peptic digestion. In the customary dietetic use of wines with meals, there is, probably, a double action; on the one hand, a stimulating action on the secretion of gastric juice, and on the muscular contractions of the stomach; and on the other hand, a retarding effect on the speed of the chemical process. In the case of persons of weak digestion, wines should be taken sparingly, and the quantity so adjusted as to bring out their stimulating action without provoking the retarding effects which follow their more liberal use. Champagne was found to have a distinctly less retarding power than an equal volume of claret or hock. This I judged to be solely due to the mechanical effects of the effervescence, and liberation of gas, whereby a more efficient stirring up of the digesting mass would be effected. Effervescent wines therefore,—other things being equal—favour the speed of peptic digestion more than still wines.

"The effects of tea, coffee, and cocoa exhibited some interesting diversity. It was found that tea had an inhibitory effect on salivary digestion; even in very minute proportion, it completely paralysed the action of saliva. On the other hand, coffee and cocoa had only a slight effect on salivary digestion. The inhibitory action of tea on saliva was found to be due to the large quantity of tannin contained in the tea-leaf. Some persons have supposed that by infusing tea for a very brief period—two or three minutes—the passage of tannin into the beverage could be avoided. This, however, is a delusion. Tannin is one of the most soluble substances known, it melts like sugar in hot water. One gentleman of my acquaintance, in his horror of tannin, was in the habit of preparing his tea by placing the dry leaves on a paper-filter, and simply pouring on the boiling water.

In this way he thought to evade the presence of tannin in his tea. But, if you try the experiment, and allow the product, as it runs through the filter, to fall into a solution of perchloride of iron, you will find that an intense inky-black coloration is produced, showing that tannin has come through in abundance. You can no more have tea without tannin, than you can have wine without alcohol; and I found, experimentally, that tea infused for two minutes had almost exactly the same inhibitory effect on digestion, as tea infused for twenty or thirty minutes. If you wish to mitigate the effects of tea on salivary digestion, you should direct the patient not to sip the beverage with the meal, but to eat first and drink afterwards. In this way time is given to the saliva to perform its functions unhindered. Another device is to introduce a pinch of carbonate of soda into the teapot; this removes the deterrent effect of tea on salivary digestion; it is a practice occasionally followed in some households, under the idea that soda helps to extract the virtue of the tea-leaves. It was found that the addition of so small a proportion as one per cent. of the weight of the dry tea, greatly mitigated its injurious effect on starch-digestion, and that twice this quantity (two per cent.) almost entirely removed it. This latter proportion corresponds roughly to ten grains of bicarbonate of soda to an ounce of tea-leaf.

"The effects of tea, coffee, and cocoa on peptic digestion were found to be as nearly as possible alike for infusion of equal strength. All three exercised a retarding effect when their proportion in the digesting mixture rose above twenty per cent. These beverages should, therefore, be taken very moderately by persons of weak digestion. The good reputation of cocoa, in regard to digestion, seems to be wholly due to the fact that it is used in weaker infusions than tea or coffee. The directions for the preparation of this beverage printed on the packets of cocoa sold in the shops, indicate a strength of about two per cent.; whereas a medium tea is usually made of a strength of four or five per cent; and a medium coffee of a strength of five to seven per cent. The strong coffee which it is customary to hand around after dinner must have a powerful retarding effect on gastric digestion; and although this practice may be salutary to robust eaters, it is not to be recommended to those of feeble peptic power."

I have preferred to make this long quotation in order to let Dr. Roberts speak for himself, as any summary might give rise to some misconceptions. Whether his conclusions will be entirely confirmed by other observations or not, we may feel pretty confident about the

main facts. The well-known effect of "high tea" *i.e.*, tea with a solid meal, seems to find its explanation in the effects of tea in retarding digestion and especially salivary digestion. If the digestion of starch be thwarted and a quantity of undigested starch be lying in the stomach, no wonder if pain and still more flatulence be experienced. The food should be eaten—say with a little effervescent water—and then the tea drunk afterwards, by those whose digestion is not that of the ostrich itself. The founder of "high tea" was certainly not a benefactor of his species; nor indeed has the introduction of tea from China—a static country, into England, a country of distinct advance—and from thence wherever the Anglo-Saxon has spread himself, been an unalloyed good. Tea and damper (a cake of dough without leaven or yeast) may be a meal of simple character and easily prepared, but nothing can be said for it from a dietetic point of view. No wonder that indigestion is as common among the stock-riders of Australia as among those of New Mexico. Tea may be drunk as a refreshing stimulant beverage; but it is not desirable as a food-accessory, especially where the food is largely farinaceous.

As to what Sir W. Roberts says about the good effects of the mixing of effervescing water with wine, and the action of the liberated carbonic acid gas upon the digesting food, it quite falls in with my own experience personal and professional, in the matter of malt liquors. I had begun to observe that for invalids and convalescents, all malt liquors should be in good condition, *i.e.*, well charged with carbonic acid; and that if "flat" or "dead" they distinctly disagreed, when a fierce attack of scarlet fever left me in a position to take further observations on myself, with the result that my impressions were confirmed. The liberated carbonic acid was a positive good; while the acetic acid of "flat" malt liquor was as distinctly injurious. We also from this can understand the value of effervescing wines over still wines in the sick room. Probably a little pure spirit with an effervescent water is the best drink for a dyspeptic or invalid, and is commonly adopted by such persons.

From what has just been said about the effect of carbonic acid in the stomach upon digesting food, the non-medical reader must not run away with the idea that flatulence ought to assist digestion; the notorious fact being that flatulence is a great part of indigestion. The gas of flatulency is quite a different gas (a light carburetted hydrogen) from carbonic acid gas (carbon and oxygen). This matter is what underlies King Chambers' statement, with which he con-

cludes his discussion on alcohol—"However little a man's purse allows him to drink, let it be good."

That wines and malt liquors have an action upon the stomach, which is pleasant and grateful, is a fact most people know for themselves. That they stimulate the gastric flow and increase the muscular activity of the stomach, is probably the underlying cause of the sense of well-being which accompanies their use. Consequently in atonic dyspepsia,—whether primary, or secondary to a general condition of debility—some combination of alcohol and carbonic acid in dilute form is indicated. But, of course, this is not to be made a rule absolutely to apply to all cases. There is a well recognized form of indigestion which is intractable to all medicine and regimen, except the avoidance of fluids. A dry dietary is a swift cure.

CHAPTER VI.

STIMULANTS.

THIS chapter covers a vexed ground—a debatable land, where views are in fierce conflict. Strong feelings have been thrown into the scale; and beef-tea, vegetable principles (as theine and caffeine) and alcohol have assailants and supporters who too often do not give each other fair play; and use declamation instead of argument—indeed, sometimes the declamation is in inverse proportion to the argument, consequently I cannot expect to please all by what will be written in this chapter; certainly, not the extremists in each wing.

Stimulants divide themselves into: (1), animal and vegetable substances of which nitrogen is the conspicuous factor (as it is of all explosive compounds); and, (2), alcohol.

A. **Animal principles.**—Beef tea may stand as the typical representative of stimulants derived from animal food at the present time, and in the present state of public opinion. Yet it is scarcely a food—as seems so universally assumed. On the very threshold of this chapter it becomes necessary to slay a popular conviction. When the relatives of a sick person tell one in all earnest, of the amount of beef they have converted into beef tea, and how the patient has been sustained thereby, it is with difficulty that the muscles of expression are prevented from throwing a derisive smile over the features. "There is no pain like the pain of a new idea" according to Bagehot; and to tell these good people that they are simply talking nonsense—that in fact they do not understand what they are talking about, would be to inflict upon them a severe shock; and would probably arouse a feeling of distrust rather than anything else in their minds. In fact, it would scarcely be a safe experiment in most households. Still, all the same, to give beef tea alone to a sick person is to give him a stone when he asks for bread. It is not a food, it is a stimulant! Grateful and acceptable alike to the palate and the stomach, possessing stimulating properties, beef tea has its value. But all the same, as regards its food-value, it is but a jackass in a lion's skin.

What can really be said for it?

It is a decided stimulant. When flesh is boiled its albumen is coagulated. That is a simple fact. Beef tea, as ordinarily prepared, contains no albumen. The fluid so obtained is rich in extractives and salines. There are present the phosphates of the flesh in solution. The extractives are nitrogenized bodies—kreatin and kreatinine—the first with the formula $C_4H_9N_3O_2$ and the latter $C_4H_7N_3O$; which means kreatin is a hydrated form of kreatinine are found in meat juice and muscle extracts; but they belong rather to muscle as derivatives—as histolytic rather than histogenetic matters. In other words, which can be understanded of the people, they are not material of which muscle can be built up; but rather stand as effete muscular matter in the road to urea. Albumen is material of which and from which tissue can be formed. It is like the bricks which are going to form the walls of a new building. Kreatin and kreatinine are rather the old bricks and mortar of an old building, (which have served their day) coming down to be carted away as rubbish. The liquor sanguinis brings the one and removes the other; just as contractors' carts may be seen together when buildings are being pulled down, and rebuilt, the one laden with new bricks for new walls, the other filled with the *débris* of old walls. Now I trust the matter is unmistakable. These extractives are not food-material for tissue; but stimulants. "Kreatin and kreatinine are products of the vital process and constituents of the flesh of all vertebrata hitherto examined. Human flesh is particularly rich in kreatin." (Liebig.) It is easy from this to understand why savages ate the bodies of their enemies believing human flesh to endow them with courage. No doubt it did stimulate them and make them feel warlike; just as Dominie Sampson felt exhilarated by some of the contents of the gipsy's cauldron, saying, "Verily I feel mighty elevated and afraid of no evil which may befall me;" a very different mental condition from that in which he was when Meg Merrilies accosted him at the Kaim of Derncleugh. Of the stimulant effects of meat extractives, of the utility of the meat salts in beef tea, there is and can be no question. But it is destitute (practically) of matter which can ever form tissue; and is equally without value as fuel-food.* As a food it is an impostor, neither more nor less. As some readers may feel indignant at this state-

* Certainly some oxidation goes on as these early products of retrograde tissue metamorphosis pass on to uric acid and urea, but it is infinitesimal.

ment, and fling out that the imposture lies rather with the writer, let Sir William Roberts once more be heard:—

"Beef tea and its congeners take rank as restoratives and stimulants, rather than as nutrients. They contain no albuminous matter in solution, and the small amount of gelatine contained in them cannot be of much account. There is a widespread misapprehension among the public in regard to the nutritive value of beef-tea. The notion prevails that the nourishing qualities of the meat pass into the decoction, and that the dry, hard remnant of meat fibre which remains undissolved is exhausted of its nutrient properties; and this latter is often given to the cat or dog, or even as I have known, thrown away as useless rubbish into the midden. A deplorable amount of waste arises from the prevalence of this erroneous notion in the households of many who can ill afford it. The proteid matter of meat is quite insoluble in boiling water, or in water heated above 160° Fahr. The ingredients which pass into solution are the sapid extractives and aslines of the meat, and nothing more except some trifling amount of gelatine. The meat remnants, on the other hand, contain the actual nutriment of the meat; and if this be beaten to a paste with a spoon, or pounded in a mortar, and duly flavoured with salt and other condiments, it constitutes not only a highly nourishing and agreeable, but also an exceedingly digestible form of food." Yes, Dr. Roberts, and there is another "deplorable waste" involved in this error and that is a "deplorable waste" of human life; hundreds of our fellow-creatures are daily dropping into their graves, unfed, unsuccoured, because beef tea is given as a food—given for what it is not!

Dogs may starve on lixiviated meat, and even turn from it with loathing; for this meat lacks the salts and extractives. But all the same, human beings cannot sustain life on salts and extractives without the other constituents of flesh. So there is another error blown to pieces, and a cherished conviction destroyed! Liebig himself knew only too well that meat broths have no true food value, and advocated cold drawn infusions of meat. Such infusions are food; and food of considerable value from the amount of albuminoid matter they contain.

I can see sundry readers having been driven past the stage of incredulity by the hard logic of facts, wringing their hands in anguish over the thought of departed relatives who have been practically starved to death on beef tea. We can feel for them if we cannot help them,—"let the dead past bury its dead"—however we may sorrow for them! Let us be wiser in the coming time.

The mistaken views about the nutritive value of beef tea have been murderous. All the bloodshed caused by the warlike ambition of Napoleon is as nothing compared to the myriads of persons who have sunk into their graves from a misplaced confidence in the food value of beef tea. As a food, it is but as the mirage of water seen by the thirsty traveller in the desert; there is no real water. So with beef tea, it is not a food.. A traveller once requested some chicken broth at an inn, when brought its quality was very indifferent. Complaining that there was nothing of the chicken about it, the waiter assured him he was mistaken—"It was made from water from a pool in which a chicken had paddled!" In so far as the fluid was "chicken broth" is beef tea a food!

What says King Chambers: "Make the cook understand that the virtue of beef tea is to contain all the contents and flavours of lean beef in a liquid form; and that its vices are to be sticky and strong and to set like a hard jelly when cold. When she understands this, let her take half a pound of fresh killed beef for every pint of beef tea required, and remove all fat, sinew, veins and bone. Let it be cut into pieces under half an inch square and soak for twelve hours in one third of the water. Let it then be taken out and simmered for two hours in the remaining two-thirds of the water, the quantity lost by evaporation being replaced from time to time. The boiling liquor is then to be poured on the cold liquor in which the meat was soaked. The solid meat is to be dried, pounded in a mortar, freed from all stringy parts and mixed with the rest."

This last matter is the important matter, to restore the meat fibrine to the fluid. That it is which gives food value to the meat infusion. At the Victoria Park Hospital we have recently had the beef tea prepared on this plan which Dr. Chambers calls "whole beef tea" and though at first the patients do not like it so well, it is of course much better for them. The nitrogenized principles derived from meat are a descending series which commence with kreatin and kreatinine and pass into tyrosin and leucin by an oxidation towards the final products, uric acid and urea. As said before, all explosive bodies contain nitrogen, and these nitrogenized bodies do not supply force in themselves, but they liberate stored force, converting it into "kinetic energy." They are like the fulminating matter of a cartridge which does not itself propel the bullet, but which explodes the gunpowder whose decomposition is the real propelling power. Consequently to give them alone to a sick person is to exhaust the stored up material—the "potential energy" whose oxidation produces

force. They should properly be accompanied by some soluble carbohydrate. To give them alone is as illogical and erroneous as it would be to thrust a bullet down a gun barrel and put on a cap,—omitting the powder. These explosive nitrogenized bodies play an interesting and important part in the economy. A carnivorous animal could never catch an antelope in a clear run, but it can make a supreme effort and pounce upon its herbivorous prey. And this it can do by the nitrogenized elements derived from its food—flesh. Greyhounds are fed on meat, because they require to put forth immense energy for a brief period. Sporting dogs who cover long distances in a day—but at a less rate of speed, are fed on broth and oatmeal. And the same occurs in the feeding of horses. Trainers will tell you that the hunter and the draught horse require to be fed differently. The hunter is bred and fed for speed and carrying power; the draught horse for bulk and strength. In the hunter is wanted rapid liberation of energy within a comparatively short space of time; in the draught horse is wanted a more gradual liberation of energy and for a longer period. To bring out these qualities each strain must be fed appropriately. The hunter is fed on a concentrated and stimulating form of food—chiefly on the heaviest and most expensive oats—which if I may so express it, is the "beef" of the vegetable feeders; and unless he is so fed, he will not perform satisfactorily in the hunting-field. The draught horse is fed on a lower and less stimulating diet—on Indian corn and chopped hay—food which tends to increase bulk and weight, (Sir Wm. Roberts' "Lectures on Dietetics and Dyspepsia"). Not only is this so, but when the ground is heavy the hunter gets some beans or peas extra—legumes which are specially rich in nitrogenized principles; while in ploughing time, especially in spring when the hardest agricultural work is performed, the farmer adds a liberal amount of oats daily to the ordinary food of his horses.

This rule applies to races. The conquering Anglo-Saxon,—the master and too often the exterminator of aborigines whose lands he covets—is a meat-eating man *par excellence*. His carnivorous propensities are linked in some subtile manner with his masterfulness.

B. **Vegetable principles.**—Closely allied in chemical composition as well as in physiological action to the animal matters, stand a certain group of vegetable principles. Tea, coffee, cocoa, and to a less extent, matè, or Paraguayan tea, are made into infusions with hot water and drank as food-accessories. Such beverages supply at once fluid for digestive purposes, and a certain stimulant

effect which has doubtless been the cause of their adoption. Theine with a formula $C_8H_{10}N_4O_2$ is the type of these principles. They are a considerable group, commencing with theine, caffeine and theobromine, and ending with brucine and strychnine,—a mighty tonic of toxic properties. Strychnine, with a formula of $C_{21}H_{22}N_2O_2$, is constantly used as a tonic of rapid action so as to come under the heading of diffusible stimulants. When the Resident Medical Officer of the Leeds Public Dispensary, where I could command any amount of drugs of every kind,—but where meat and drink were beyond my reach,—I found in many cases of debility and convalescence from acute disease, that ammonia and nux vomica in combination, supplied the place of alcohol very fairly.

The chemical composition of these vegetable principles, and the similarity of their action was a matter which did not escape the observation of Liebig, who wrote—"Theine is related, in composition, to no organic nitrogenized base more closely than to kreatinine, that remarkable compound produced in the vital process, and occurring in the muscular system of animals; and to glycocoll, which we may suppose to exist in gelatine, coupled with another compound, as may be seen by the following formula:

Theine, ...	$C_8N_2H_3O_2$
Kreatinine, ...	$C_8N_3H_2O_2$
Glycocoll (anhydrous), ...	$C_8N_2H_8O_6$
Kreatin, ...	$C_8N_3H_{11}O_6$
Theobromine, (in Cacao), . . .	$C_7N_2H_4O_2$

There are no drinks which in their complexity and in the nature of certain constituents have more resemblance with soup than tea and coffee; and it is very probable that the use of them as a part of food depends on the exciting and vivifying action which they have in common with soup.

There are some discrepancies betwixt these and more modern formulæ, which may or may not depend upon the new notation; but which are of comparative unimportance as compared with the main fact of the strong similarity and chemical resemblance which exists between these substances. Infusions of meat and infusions of certain vegetable principles alike contain stimulant matters, whose properties rest upon the large proportion of nitrogen they in common possess.

These vegetable principles are used largely by races who do not take alcohol. The Arab and the Turk, forbidden by their religions

to taste alcohol, have found a substitute in coffee; while the abstemious Chinaman has cultivated the Tea-plant. The total abstainer of Anglo-Saxon descent has adopted the drinks of these races. "It is true that thousands have lived without a knowledge of tea or coffee, and daily experience teaches us that under certain circumstances, they may be dispensed with without disadvantage to the merely animal vital functions. But it is an error, certainly to conclude from this that they may be altogether dispensed with, in reference to their effects; and it is a question whether, if we had not tea and coffee, the popular instinct would not seek for and discover the means of replacing them. Science, which accuses us of so much in this respect, will have in the first place, to ascertain whether it depends on sensual and sinful inclinations merely, that every people of the globe has appropriated some such means of acting on the nervous life,—from the shore of the Pacific, where the Indian retires from life for a few days, in order to enjoy the bliss of intoxication with koka, to the Arctic regions, where Kamschatdales and Koriakes prepare an intoxicating beverage from a poisonous mushroom." (Liebig.)

Not only is there a widespread instinct for "these means of acting on the nervous life," as Liebig happily phrases it; but the consequence of excessive indulgence is seen in the various nervous affections which we notoriously associate therewith.

The "tea-drinker's heart" is a well-recognized malady. People, especially of the female sex, who drink largely of tea, and still more when they do not eat a sufficient quantity of food, suffer from many nervous troubles as well as palpitation and neuralgia; and present all the phenomena of nerve-exhaustion. The nurse often drinks tea to sustain her when there is no appetite for food, until utter exhaustion is the untoward result; and a state bordering on the delirium tremens of alcoholic excess is revealed. The "tea-drunkard" is a well-known patient at all hospitals; and is not unknown in private practice. "The cup which cheers but does not inebriate" is not without a toxic influence, when taken to excess.

While tea is in almost universal use with the Anglo-Saxon, coffee is equally in vogue with the Germans. They have the same action to a great extent. Coffee, however, has a distinct effect upon the heart; and caffeine with a formula of $C_8H_{10}N_4O_2$ is used as a medicine in cases of cardiac debility. Vogel has advocated the use of strong coffee with cream as a tonic and food in the debility which attends upon acute disease in children. No such use of tea has as

yet found an advocate. Tea contains an aromatic oil as well as theine, and its effects upon the nervous system—for good or evil—may to some extent be due to this rather than the theine.

So much then for those stimulant bodies derived from the animal and vegetable worlds alike, whose properties depend upon the nitrogen contained in them.

Alcohol.—If the matter of beef tea is difficult of discussion in consequence of ignorance and prejudice, how much more difficult is it to handle alcohol—a matter bristling with difficulties, when the pure white light of truth can scarcely be seen clear of the coloured rays around it?

Alcohol has a formula C_2H_6O (better known, however, by the old formula $C_4H_6O_2$), and is a readily combustible substance—out of the body. A very light, volatile body it is, highly inflammable. All matters which are oxidizable in the body are "foods" (Hermann). Liebig held the opinion that "Alcohol stands only second to fat as a respiratory material" while adding "Alcohol and alcoholic drinks are from their price most costly materials of respiration. The same effect could be produced in the body by means of saccharine and farinaceous articles of food at one-fourth or one-fifth of the cost." A fierce war, embittered by the presence of sentiment, has raged around the matter of the food-value of alcohol. Readily combustible outside the body, some have denied its combustibility within the body. Fifty years ago, the most advanced chemists believed in the "spontaneous combustion" of the bodies of drunkards. In that they were certainly mistaken. Then came the recoil of opinion. Total abstainers are ranked in battle array on the matter with other observers. These last, and their names are both numerous and weighty, hold that alcohol is largely burnt in the body by oxidation and is therefore a "fuel food." Personally, after very considerable attention to the subject, I must say that I am among those who hold "that the chief portion of the alcohol injected undergoes consumption in the body."

But the question of "alcohol as a food" can never be separated or divorced from that of "alcohol as a stimulant;" as a force-liberator. Liebig recognized this aspect of the subject, and wrote as follows:—

"The use of spirits is not the cause but an effect of poverty. It is an exception from the rule when a well-fed man becomes a spirit drinker. On the other hand, when the laborer earns by his work less than is required to provide the amount of food which is indis-

pensable in order to restore fully his working power, an unyielding, inexorable law or necessity compels him to have recourse to spirits. He must work; but in consequence of insufficient food, a certain portion of his working power is daily wasting. Spirits by their action on the nerves, enable him to make up the deficient power *at the expense of his body*, to consume to-day that quantity which ought naturally to have been employed a day later. He draws, so to speak, a bill on his health, which must be always renewed because, for want of means, he cannot take it up; he consumes his capital instead of his interest; and the result is the inevitable bankruptcy of his body."

This matter of "physiological bankruptcy" made a deep impression upon me at the very threshold of my entrance upon medical practice, and has been my guide to the use of alcoholic stimulants in the treatment of disease. If much alcohol be given without other readily oxidizable food—while furnishing a certain amount of respiratory food in itself—its effect is to consume the body-store: in other words to produce "physiological bankruptcy." Especially is this matter to be borne in mind when there is danger of the system sinking from exhaustion. There is a deep-rooted fear in my mind that many a case of acute disease (and especially in fevers running a certain course of so many days) has been sent into "a grave never dug by nature" (as H. C. Wood pithily puts it) by over stimulation; by "physiological bankruptcy." Other hydro-carbonaceous food as well would have been preferable; and the displays of energy evoked by doses of alcohol, were as disastrous as the displays of wealth manifested by a reckless young squire who raises the means for them by mortgages on his property; each display rendering him distinctly poorer.

This great cardinal fact that stimulants are "force-liberators" must never be forgotten in practice. If force must be set free to meet some emergency then alcohol—supplying some force in itself as well as liberating other force—may be urgently called for; but the after effect must not be left out of the calculation. In syncope in conditions of acute exhaustion free resort to alcohol may be the only means at hand; and may be, too, it becomes necessary to give it in unstinted quantities to tide over the immediate danger; but the whole of its operation must be borne in mind all the same.

As to the "food-value" of alcohol in health it is utterly subordinate to its action on the nervous system. Liebig has pointed out its costliness. Further, before a man could take in the equiva-

lent of a fair meal in alcohol, he would be dead drunk. If he took it comparatively quickly—as when men, for wagers, drink so much spirits in a limited time—the strong probability is, he would in a very short time sink into coma; which ere long would deepen into death. Its "food-value" in health is such that its consideration need not engage our attention for long.

But in ill health and especially in acute disease the question of its "food-value" as well as its value as a "stimulant," may well engage our attention at some length. As well as a force-liberator it has some value as a "fuel-food." Indeed, at times, dilute alcohol is all that the patient can take, or the stomach retain. Alcohol requires no digestion; let that fact be kept in view. By its ready diffusibility it quickly passes by osmosis from the stomach into the blood. When the digestive powers are seriously enfeebled this matter becomes very important. Alcohol provides some force, and borrows some from the system. How far can the borrowing go on? That becomes the question. It may be possible to provide the alcohol in unlimited quantities; but is the store of body force illimitable? That is where the shoe pinches. Whenever possible or practicable the alcohol should be accompanied by some soluble carbo-hydrates, which would supply the place of the borrowed force. Say with some Malt Extract diluted; that would be a capital combination; or in milk, excellent. Or with lemonade, home made, containing a distinct amount of soluble sugar. The neglect of this matter is fraught with disaster. This will be further considered when the treatment of exhaustion comes to be discussed.

The effect of alcohol is to produce increased action in the heart, while the carotid arteries are dilated, and so the brain is flushed with blood. This flooding of the posterior cerebral lobes produces a sense of well-being, *i.e.*, the patient feels better for the time; no doubt, too, the alcohol borne along in the blood acts directly upon the cerebral cells. Probably a like continued effect of increased blood supply and direct stimulation goes on in all parts of the nervous system—the organic or sympathetic as well as the cerebro-spinal. But this effect is temporary and evanescent. Such stimulation carries with it the after effect of exhaustion. The heart flags, the carotids contract below their normal calibre and the brain becomes bloodless. If this lead to sleep, as often happens, then the alcohol may have been advantageous in every way. But the temporary time of stimulation ought to be utilized to assimilate some easily digestible food. Otherwise, it may have been useless; ay,

worse than useless. King Chambers says wisely of alcohol; "Let the alcoholic drink be limited to that quantity which increases the appetite." He is at the time speaking of its use in heart failure. But the principle is a good one to hold to under all circumstances.

Alcohol is a two-edged tool, not to be used without reflection; and, like any other tool, all the more skilfully used from familiarity with it. Sometimes it is withheld when the call for it is urgent. At other times it is pushed recklessly, and alcoholic gastritis is set up; the stomach rejecting it quickly, while the tongue is red and irritable, and the bowels filled with flatus. This condition is induced when alcohol, commonly in the form of brandy, is given in considerable quantities, insufficiently diluted, and at frequent intervals. Here Nature is stepping in to limit that stimulation which is threatening the existence of the organism—when exhaustion is close at hand, and "the beating of the wings of the Angel of Death are distinctly audible overhead."

This condition of exhaustion is specially liable to come on when alcohol, alternately with beef tea, is alone given to the patient. Beef tea which (as ordinarily made) is no food; alcohol which is a food, carrying with it a heavy borrowing power! No wonder the system is in danger of sinking from exhaustion. All that has been said here applies to acute conditions, as fevers, and also to conditions not exactly acute, as in dropsy with a failing heart; or in acute conditions implanted upon a chronic state, as in an acute bronchial attack in a person the subject of chronic bronchitis. Here we wish to sustain the powers, and for that end we use alcohol. But we must so use it in combination with soluble carbo-hydrates that we do not make it a means of sinking the ship. If it be given along with, or alternately with, a meat broth containing some baked flour, with milk, or diluted malt extract, then the power may be sustained and the strength be kept up or maintained. But when alcohol alone is administered experience has told us in unmistakable accents the end is not far off.

We are told "to use the good things of this world as not abusing them;" and to do this with alcohol is a feat of judgment. First comes the requisite knowledge; then the judgment to use the knowledge aright. In times of acute depression alcohol is of incalculable value. But then the end must be kept well in view. An alcoholic course must not be indefinite; must not indeed be prolonged. In proportion as it can be combined with other food may its use be continued. But when it alone can be taken the end is within a

measurable distance. So much for alcohol as at once a food and a stimulant—a "force liberator."

When the subject of malt liquors comes before us, then no one can dispute, or think of disputing the food value of the maltose contained therein. In the brewing process a certain quantity of maltose is broken up into alcohol and carbonic acid; while a distinct proportion remains unchanged. Consequently the well-fed navvy who prefers to do the 1 st hour's work of his laborious day on a pint of good sound ale, has a hard solid argument on his side. Having expounded my own views at some length and as judiciously weighed the subject as in my power lies, some reference may be made to wha other men have thought and written on this difficult and complex subject. Brinton in "Food and its Digestion" after going over the pros and cons, wrote—after giving the obvious drawbacks of alcoholic indulgence and how it blunts alike the mental edge and the delicacy of touch and movement:

"On the other hand, however, it is necessary to remember how often the whole question must practically be approached from a totally different aspect; how often alcohol constitutes not the single feather which distracts the sleepy savage, but the bed of down which restores the exhausted man. It may disturb a balance exquisitely adjusted; and yet, in the main, counterpoise a scale heavily laden with disadvantages. If alcohol exhilarates, imparts comfort and energy, counteracts fatigue, hunger and unrest, then it does in effect, increase the capacity for work of those who take it under such circumstances; and affords, in so far, a direct benefit and advantage."

Pavy says of it as a food: "From a review of the evidence as it at present stands, it may reasonably be inferred that there is sufficient before us to justify the conclusion that the main portion of the alcohol ingested, becomes destroyed within the system, and, if this be the case, it may fairly be assumed that the destruction is attended with oxidation and a corresponding liberation of force; unless, indeed, it should undergo metamorphosis into a principle to be temporarily retained, but nevertheless ultimately applied to force-production."

King Chambers sums up his consideration of alcohol so: "—(A). Let it be taken never as a stimulant or preparative for work, but as a defence against the injury done by work, whether of mind or body. For example; it is best taken with the evening meal, or after toil.

(B). Let the increase in the desire for and power of digesting food be the guide and limit to the consumption of all alcoholic liquids.

(C). Let the forms be such as contain the least proportion of fusel oil.

(D). Let all with an hereditary tendency to hysteria or other functional disease of the nervous system, refrain from its use altogether, even though as yet they are in good health. Among the hereditary tendencies must be classed a proclivity to delight in drunkenness, which remarkably runs in families. Children with such an heirloom had best be kept to as late an age as possible without tasting strong drink."

Indeed, there can be no question about the desirability of withholding alcohol from children under all circumstances but those of dire necessity. It is an injury to a child, to subject its tissues to the action of alcohol. Children are in many respects like inferior races. And of these Sir William Roberts writes:—"There are certain inferior races who appear to be altogether intolerant of alcohol. Either it does not suit their type of nutrition, or they lack the self-control which is necessary to its beneficial use. The Indians of North America are said to be excited almost to madness, by any use of alcohol, insomuch that the Colonial authorities forbid, under heavy penalties, the giving or selling of alcoholic liquors to the native tribes. The Ainos of Yezo, a subject race inhabiting the Northern island of Japan, appear to be wholly wanting in self-control in the use of alcoholic stimulants, for which they evince an irrepressible passion. Whenever they have the opportunity, both the men and women drink themselves to a state of insensibility. The defective reaction of these races towards alcohol may be compared to a similarly defective reaction in certain individuals and certain families among ourselves." *

On the other hand, just as strong men usually tolerate alcohol well, so apparently do the stronger races of mankind. King Chambers writes:—"All nations that have led the van in the march of civilization have been addicted to drink,—ay, and addicted to drunkenness. The Jews, the Greeks, the Romans, the Germans, the Swedes, the Danes—not to mention the English all round the globe, are amply attested by their own native literature to have been distinguished above their contemporaries in this way. It is true that some reactionary races, famous as conquerors, have been abstinent,

* Canon Kemmis, of Sidney, informs me that this intolerance of alcohol is equally manifested by the Aborigines of Australia; who should, he says, be protected against alcohol as are the Red Indian subjects of the English Crown.

but they and their faiths are dying out, and the coloring they have given to civilization is even now fainter than that left by the robuster races a thousand years before they were heard of." While Maudsley has pointed out that drunkards in society are like the waste-heaps of manufacturing industries—they are so many witnesses of the intellectual activity going on around them. The stronger the race, the greater their enjoyment of that exaltation which alcohol produces. As Burns says:—

John Barleycorn was a hero bold,
Of noble enterprise:
For if you do but taste his blood,
'T will make your courage rise.

'T will make a man forget his woe;
'T will heighten all his joy;
'T will make the widow's heart to sing,
Though the tear were in her eye."

This effect it is which constitutes the danger of alcohol; and if the delight in such excitement cannot be kept within strict bounds, the downward career of alcoholic excess ending in drunkenness and degradation, is apt to be set on foot.

In concluding his contribution to "The Alcohol Question," which was discussed in the "Contemporary Review," some few years ago, Dr. Sam. Wilks said:—"In judging of the use of alcohol by the community at large, we must be guided in the same way as we are by other habits of mankind. We see persons enjoying themselves in various ways, eating and drinking all kinds of food and beverages, occupying themselves with amusements of every description, and yet none of these would be allowed in Utopia. They get through the world, although indulging in certain habits, and declare themselves well—where, then, is the appeal against their procedure? If I, personally, am consulted as to the propriety of ordering alcohol in any individual case, if there be no experience to guide me, I am impelled by the principles I have enunciated. I believe alcohol soothes a worried nervous system, and by preventing wear and tear, actually supports the frame; but, discarding the notion of its stimulating properties, I denounce its use in delicate children and in women who feel 'low.' I also strongly prohibit its use in the early morning; in fact, those who then wish for it, have already imbibed too much. I always suspect people who require 'something' about eleven in the morning. Indeed, the man or woman

who has an acute consciousness of the hour of eleven is a being both physically and morally lost."

No doubt there is much truth as well as force in these remarks; and there are two matters connected with alcohol, well worth bearing in mind:—

1. Never have alcohol in the brain when it has work to do;

2. A little alcohol betwixt a man and a past trouble, is permissible; but it is not well to put a little alcohol in front of a coming trouble.

I may fitly conclude this chapter by a quotation from the late Dr. Murchison, whose book on Fevers is so favourably known everywhere:—

"What then are the conditions of the animal economy in which alcohol may be of positive use? That there are such conditions I believe cannot be denied by anyone who has honestly studied the subject; but they are not the conditions of perfect health. It is especially when the circulation is weak or sluggish, that a daily allowance of alcohol may do good. Thus—

"1. Alcohol is useful in the course of most acute diseases, when the organs of circulation begin to fail, as they are apt to do. A moderate quantity usually suffices. The large quantity—*e.g.*, one or two bottles of brandy in twenty-four hours—still sometimes administered, may do harm by inducing congestion of various internal organs.

"2. In convalescence from acute diseases, or from other weakening ailments, when the circulation remains feeble and the temperature is often subnormal, alcohol is also useful in promoting the circulation and assisting digestion.

"3. In persons of advanced life the circulation is also often feeble, and a moderate allowance of alcohol often appears to be beneficial.

"All other conditions of the system marked by weakness of the muscular wall of the heart, whether permanent or transient, are usually benefited by alcohol."

Alcohol is "a good servant, but a bad master."

The charge brought against the medical profession, that much alcoholic excess takes its origin in medical advice—is a charge easily preferred. It is undoubtedly often made the excuse for the habit. I certainly think the greatest caution should be exercised in the case of neurotic women and their children, where there is often a craving for alcohol, and the habit is most easily acquired. In its use we must never forget its possible abuse.

CHAPTER VII.

FLUID FOOD.

THE type of "Fluid Food" is Milk—the food Nature provides for all young mammalians. It is a complete and perfect food, containing fat (in an emulsionised form,) albumen, (in the form of casein,) carbo-hydrates, (as milk-sugar,) with salts, (phosphates and others,) all properly diluted. On this food life can be sustained for an indefinite period. In sickness, milk is really our sheet-anchor. But there is one matter to be borne in mind, and that is this—milk curdles as the first step in its digestion. The light curd usually readily re-dissolves in the alimentary canal; but sometimes it does not. Especially is this firm curdling liable to occur where there is acidity present in the digestive tract. The hard, firm curd is an irritant to the whole intestinal surface; and in conditions of ulceration, either tuberculous or that set up in enteric fever, hard pieces of curd may rupture, or perforate the weakened bowel. The pieces of curd may be seen in the stools. When such is the case the milk must be combined with means which will prevent this hard curd forming. At times it is well to stir some biscuit powder into the milk, which mechanically prevents too firm a curd; or, where obvious acidity is present, some light carbonate of magnesia, which acts in two ways. First of all it chemically neutralizes the acidity; next the carbonic acid gas given off tends to disintegrate the curd and break it up. Milk is commonly given with lime water; but this is often too feebly alkaline, and magnesia or prepared chalk must be used. Usually as much as will lie on a sixpence (or its U. S. A. equivalent) to the half pint of milk is enough; or it may be given with a mineral water as Seltzer water, especially where the thirst is considerable. At other times it is well to combine it with such waters as Vichy, Vals, Marienbad; and in some conditions of lithiasis such combination may be freely drank.

At other times some malt extract well diluted may be added to the milk with advantage. This last is indicated in those cases where the patient feels the long fast betwixt going to bed and rising, or either betwixt the usual hours of bedtime and of rising; and

something is desirable in the small hours of the morning. A tablespoonful of malt extract to half a pint of warm milk in a hot-water jug (with a lid) put on a piece of wood, or other non-conductor of heat, and covered with a tea cosey (the bigger and thicker the better), will be found a pleasant, palatable, and nutritious drink. The tea cosey will retain the heat.

Then at other times milk is boiled with a little ground rice flavoured with cinnamon; and this is an excellent food when there is any looseness of the bowels.

Skim-milk is an excellent beverage in pyrexial states, where fresh milk is too heavy. Buttermilk with its lactic acid is a good beverage where there is much thirst and in diabetes.

Milk is sometimes too cloying and is preferred in the form of whey. Whey is a pleasant stimulant drink-food. It is made by adding one or two wineglassfuls of sherry to half a pint of hot milk; the curd is strained out by a sieve. It is not in fashion at present; but its day will come again. The milk-sugar in it gives it a certain food value.

Then there are certain pleasant drinks with a low food value, good in fevers, as apple-water, and tamarind water. They are pleasant to the taste. A favorite drink is lemonade. The rind should be thinly pared (to get out the essential oil) and the lemon be cut into slices, put into a jug and hot water be poured in. Then some sugar should be added or if this be apt to turn sour in the stomach some malt extract may be used instead of cane sugar. Such lemonade is grateful and nutritive; especially when made with malt extract or with Mellin's Food.*

Then as a "drink-food," oatmeal water is capital where persons are exposed to a high temperature as stokers, iron-workers and the like.

Barley water is a pleasant nutritive drink, and a capital vehicle for bitartrate of potash. Potus Imperialis sweetened is a capital beverage, good in a cold with a deposit of pink lithates.

Rice water is a drink in vogue in India. It is a nutritive drink, —and thereby hangs a tale. When Clive was besieged in Arcot, provisions ran very short. There were a few Englishmen and a number of Sepoys. This is Macaulay's account of what happened:—

* It is invidious to mention names in connection with foods, but Mr. Mellin has been such a pioneer, that his food may be spoken of as the type of a most useful class of foods and as such it is spoken of frequently. Beyond his food Mr. Mellin is unkown to me.

"The Sepoys came to Clive, not to complain of their scanty fare, but to propose that all the grain should be given to the Europeans, who required more nourishment than the natives of Asia. The thin gruel, they said, which was strained away from the rice would suffice for themselves. History contains no more touching instance of military fidelity, or of the influence of a commanding mind." Literature contains no more striking instance of a man, accurate by habit, tripping egregiously. Those who understand the matter thoroughly assure me that the men who were satisfied with "the thin gruel" got much the best of the bargain.

Rice water may be flavoured by any vegetable juice as that of the currant, raspberry, apple, and mulberry. Where there is great thirst in pyrexia, such drinks supply all that is required. In phthisis however, it is desirable to increase the food value of the drink, and this can be done by the addition of a malt extract, or soluble malt preparation like Mellin's.

Rice which has been malted forms a capital addition to meat-broths, as the starch has largely been rendered soluble.

Dextro-saccharin, (?) or commercial grape sugar, prepared for the brewer, can also be utilised to give food value to drinks—whether meat-broths, or made with vegetable material, as apple-water.

Meat Broths.—Beef, veal, mutton, rabbit, and chicken, are the materials mainly employed for the preparation of meat tea. In the last chapter it is to be hoped that the brains have been knocked out of the superstition that beef tea, or any other meat tea, as ordinarily made, is a food. The addition of the albumen of the meat-fibre is required to give it a true food value. If that were done, the amount or bulk of water to the pound of meat might be largely increased. Then too, a certain amount of salt should be added. In invalid cookery there is a decided neglect of salt. Liebig advocated the use of meat extracts. He deplored the waste that went on in the large hordes of cattle on the plains of South America and Australia, where thousands of oxen were annually slaughtered for their hides and tallow; and suggested the preparation of concentrated meat-extracts from the flesh. But Liebig himself was the first to recognize that such meat-extracts were a "means of invigoration," rather than a food. There are present the pleasant salts of muscular tissue and the stimulant kreatin, which tempts the savage to eat his vanquished adversary—but nothing that is true food.

Beef, or meat teas, as ordinarily made, and Liebig's meat ex-

tracts stand on the same platform; they are not practically food. But they are excellent vehicles for soluble carbo-hydrates; and then the combination is a food—a pleasant, nutritive, digestible food too!

And at this point I feel inclined to be dogmatic, even more than usual; unnecessarily so, perhaps the hostile critic will say; but it must be done. "Whole beef tea," that is—beef tea to which the meat fibre has been restored after pounding, is no doubt a good food. Very good, no doubt, in convalescence from acute diseases, where wasted muscular tissue has to be repaired. But in such patients as I have constantly under care at the hospitals, as phthisical patients either of chronic character, or with hectic in softening tubercle, or chronic bronchitis, or pleuritic effusions, and in cardiac cases, valvular lesions or weakened walls,—cases seen in plenty of persons outside hospitals—it is open to question whether so very much albuminous matter is either good or desirable. The beef tea might be very much weaker and be flavoured with salt, and some soluble carbo-hydrate added. If the reader will at this point make personal trial of what is being said—(an excellent practice with anything—food or medicine—that has to pass the palate)—it will be well; and will make the matter perfectly clear. Add a teaspoonful of any baked flour, of which Ridge's food is a type, to a teacupful of ordinary beef tea, and then add some salt; first look at the inviting soup so produced—that is an appeal to one special sense, the eye; then taste—an appeal to the gustatory nerve. As to its palatableness it is unnecessary here to speak. But for the reader who is content to read and not to taste and try, he or she may take my word for it. Well-baked flour is largely changed into soluble dextrine; and beef tea containing some such addition, is a capital food. If the flour be made from unbolted flour, *i.e.*, where the bran has not been removed, then some albuminoid matter is present as well as the salts of the grain. Such will make an ideal fluid-food.

The steam-cooked cereals, of which there are so many varieties produced by different makers in the U. S. A., are admirable for addition to meat broths. Plain biscuits powdered are also good. The Channel Islanders always add broken biscuit to their soups, and thus give them a high food value. Soups are indeed all the better for such addition, no matter whether made of stock, fish or flesh, or of vegetable matter. Sago is often added; and if exposed to heat in the oven for an hour before being added to the soup, is all the more digestible. The same may be said of tapioca and rice. The starch-transformation into soluble dextrine is so brought

about. Of course where cereals have been cooked by steam—much better than boiling water—this starch-transformation is more complete. Whether the soup be white or brown, cooked farina can be added with advantage as raising its food value.

Meat juice is of course a better food than a meat infusion, as it contains some albuminous matter. Mr. Mann-Valentine has identified his name with such meat juice. Others have followed in his footsteps. Murdoch has mixed meat juice with the juices of vegetables; a capital combination—in theory. But such preparations are not acceptable to the genuine Briton with his insular prejudices.

Then there are in the market "lactated foods." That is, combinations of cereal matters with milk, desiccated. These are all good. And variety is as acceptable to persons who are put upon a "regulated dietary" as for other more fortunate persons, who can eat what they please.

The sting of a "regulated dietary" lies in its monotony. The palate palls at the restricted variety of food, and the person abstains from food as much as possible—hungers, in fact. Austin Flint and Lauder Brunton are quite right in their criticisms on the effects of a "restricted dietary." Still, the dietary may be judicious and appropriate, and yet be varied—*i.e.*, if either doctor or patient know enough upon the subject. That is where the shoe pinches! Neither, commonly, are sufficiently familiar with food in all its aspects, to get over the difficulty. It is want of knowledge on culinary matters, that makes the dietary so restricted. And as our acquaintance with food increases, and familiarity with cookery books becomes part of medical teaching, the difficulty will be got over; and the invalid and dyspeptic be proportionately grateful.

The scientific aspect of food must be united in the bonds of holy matrimony with a practical knowledge of the cook's art, before a man can discourse learnedly of food. And another matter is—never take for granted that any cooked compound will necessarily be nice—either to the eye or palate. Taste and try! That is the only solution. I have been a judge at a food show, and ate some of all the exhibits; the palate being martyred to a great extent. I have tried most baby-foods. I have held deep consultations with cooks and housewives; I have experimented with foods to ascertain the food-value in relation to cost for some articles, ("Food for the Economical") in *Good Words;* I have eaten every variety of tinned and preserved fruits; in fact, my personal experience extends

over the whole known field—except a cod-liver oil emulsion. That is a *terra incognita* to my gustatory nerve fibrils.

Malt Extracts.—These are quite a modern form of food. Hoff's first idea was a preparation of malt which should contain all the qualities of beer, without the intoxicating alcohol. The maltster malts the grain, by which a certain starch transformation is produced; then the brewer mashes the malt with hot water, by which further starch-transformation is effected; and his "wort" is a sweet fluid, rich in maltose. The brewer then adds his yeast to the wort and then the maltose (or grape-sugar) is fermented into alcohol and carbonic acid. The malt extract manufacturer stops at the wort; and instead of adding yeast, evaporates the wort in a vacuum-pan, into a fluid like molasses. A malt-extract is, however, something more than either molasses, honey, or invert sugar. It contains, as well as carbo-hydrates, some soluble albuminoids and salts. In fact, it forms a very excellent food. It is not, however, as complete a food as milk, as it lacks fat. Some advertisements of malted foods talk of their being "substitutes for milk." That they are not;—and cannot be! But a malt-extract is a lovely food all the same. And when a stomach is in active revolt, a teaspoonful of malt-extract every hour is an aliment which offends it neither by bulk nor qualities.

Malt-extracts have been lauded for their diastasic power—their capacity to digest starch; but the diastasic power of a malt-extract is far below that of ordinary malt. Ground malt has a great future before it. As the digestive organs are enfeebled by the advance of civilization, predigested starch must come more and more to the front. And ground malt added to baked flour, or baked farina in any form, before the hot milk is poured on, makes a most digestible dish. This milk pudding should, when mixed, be placed on a hot plate, or anywhere else where its heat will be maintained, and then the diastase of the malt acts promptly upon the farina. Such a milk pudding is very fluid. It requires no cane sugar to sweeten it. This is a great matter with stomachs in which ordinary cane sugar swiftly turns acid. An egg may be added or not, according to circumstances. This is a far more efficient method of predigesting starch than mixing a malt-extract with a milk pudding before serving in the nursery.

On the other hand, a malt extract can be made a pleasant beverage by diluting it with a little water, (to make it of the consistency of a syrup), and then adding an aërated water.

Gruels.—The admixture of farina with water or milk forms a gruel. Oatmeal is the form of farina usually employed in the making of gruel. Boiled in water with a knob of sugar dissolved, and a piece of butter added, oatmeal gruel is reckoned a sovereign remedy for a cold. Oatmeal gruel made with milk is splendid food. As the porridge of Scotland, and the North of England, this is the staple of breakfast with the whole of the working population; which, in thews and sinews as well as bones, can stand comparison with any race on the earth's surface. An excellent sustaining drink for the hay or harvest field, for foundries, stoke-holes, etc., is supplied by adding a handful of oatmeal to a gallon of water.

Boiled arrowroot was once in vogue for invalids, but is not fashionable at the present day. It was very good fuel-food; and sweetened with sugar and flavoured with wine was not at all unpalatable. But it is inferior in every way to a "treacle posset." This last consists of a pint of milk, a tablespoonful of treacle, a teaspoonful of powdered ginger, with as much rum as the drinker fancies. Not only is this good for a cold, but it has a high food-value. Such a posset last thing on getting into bed, would cheer many a starveling, and ill-nourished person.

Eggs.—The egg is certainly a fluid food until its albumen is consolidated by heat. An egg, beaten up with coffee, is a drink relished by many. Others prefer it with sherry. Some like it with milk and brandy. With a pinch of pepper and salt, and a little vinegar, an egg forms "a prairie oyster." The white of an egg added to home-made lemonade, enables it to be frothed up. This is a pleasant and nutritive drink. Under other circumstances the yolk is the part preferred. It can be taken with wine, or milk and brandy. The yolk of an egg is a constituent factor of the "rum and milk," so famous in the treatment of phthisis. Half a pint of milk, the newer and fresher the better, the yolk of an egg, a teaspoonful of sugar, a suspicion of nutmeg and a spoonful (the size varies) of rum, all beaten together and taken the first thing in the morning, has been credited with the cure of many cases of consumption. Taken early, it will often prevent the exhausting sweats which accompany the morning doze. For this purpose it should be taken about six or so, and after it, the patient often sleeps protected against hydrosis. Or it may be taken before dressing, and often enables an invalid to get over that tiresome process without a sense of exhaustion.

Syrups.—Then there are syrups of various kinds. The Germans

are fond of strawberry syrup, and raspberry syrup, to drink as beverages; especially to breakfast, in lieu of tea or coffee. These syrups are very palatable, and decidedly nutritive.

Syrups of all kinds are in vogue at present, to drink with aërated waters. They were in fashion in the past, with hot water, and were drunk for a cold, or when coming in from exposure to cold. Few middle-aged persons cannot remember the elderberry syrup which was made in every household; and very nice it was—at least one person thinks.

There are many circumstances where fluid food is desirable. What is most wanted is a knowledge of how to give food-value to meat-infusions; and on this section of the subject a murderous misapprehension prevails at present, which may well be dissipated—with advantage to all sick persons.

Koumiss.—A fluid food now becoming rather fashionable, is fermented mares' milk. Early travellers in Tartary spoke of this fermented mares' milk as an intoxicating drink among the Kalmucs. Its intoxicating properties are small as regards Western races. The casein of mares' milk forms the fine, flocculent curd characteristic of woman's milk; contrasting with the solid curd of cows' milk. As a cure for phthisis, it has a distinct reputation in the east of Europe. Dr. Carrick, of St. Petersburg, had a number of mares brought to England and exhibited at South Kensington in 1884. He had studied the matter thoroughly, and written a small book on "Koumiss" (published by Blackwood and Sons). He showed Koumiss made from mares' milk as on the Steppes. It was a pleasant drink with the curd in small flocculent masses. But, as he observed to me—"Koumiss is comparatively useless in a damp climate like England, because a person cannot drink enough of it. On the arid Steppes, where the evaporation of fluid is great, a delicate person can with ease drink from fifteen to sixteen champagne quarts of Koumiss in a day. Under those circumstances the effects of Koumiss are often very striking." From this it would seem that it is comparatively useless to try Koumiss except on the Steppes. Certainly in pyrexial states it may be found a pleasant drink; and seems especially suited to irritable conditions of the stomach, as in the intercurrent gastric disturbances of phthisis—where there is also a rise of temperature. In some cases its good effects are very apparent.

CHAPTER VIII.

PRESERVED AND CANNED FOODS.

THE qualities and properties of foods are not altered by the means resorted to for their preservation, at least to any material extent, as regards their food value. Still preserved foods require some attention in a work of this kind.

Probably the earliest method of preserving food was a blending of salting and drying. Not only was the pig so converted into bacon and ham, but the fattest oxen were selected in October and salted—the rest being turned loose to find their winter food as best they could. Mutton hams, too, were a delicacy. On such salted provisions the bulk of families in the country lived during the winter months. The pig, which could be fed on corn and the slops of the household, supplied the sole fresh meat. If the pig was not at hand (and in Scotland of yore the pig was as objectionable as an eel) and some fresh food was craved after, the cattle were driven into a pound, and bled, and this blood was mixed with barley, made into a pudding, baked, and eaten. When the pig was slaughtered, the blood was made into a "black-pudding" which kept well for some weeks. Sausages were made of the fat and lean meat chopped together and flavored with sage and other condiments. Bacon is a food of the greatest value; the lean is apt to be hard, but the fat is of the most excellent character. It is easily digestible and agreeable to the palate. It may be fried, as the rasher; and rashers of bacon with fried or poached eggs is a stock breakfast dish over the length and breadth of England; or it may be boiled and eaten cold with pickles. Beyond that, too fat bacon is used to lard fowls, liver, venison, etc., to add to dry meat as the hare and rabbit (which should always be stewed with some pieces of fat bacon), and to veal in a pie. However, as a matter of fact, it is if anything too little used as an adjunct to other food. The inside fat of the pig is "rendered" into lard, which is used in the making of pastry. The hams are a favourite food, and a slice of cold boiled ham will usually sit easily upon the most fastidious stomach. In speaking of "chronic gastritis," Austin Flint, after recommending milk and

farinaceo s food, quotes Jaccond who was in favour of a diet of animal food. "He advises that the patient be encouraged to take certain kinds of food which are supposed to excite, more than other kinds, the secretion of gastric juice, and he mentions boiled ham as particularly eligible for that purpose." A thin slice of the lean of boiled ham cut across the fibre, well masticated, will no doubt be tolerated by a very irritable stomach.

Sausages are a very toothsome form of food. As ordinarily made they are known in London as "skin and mystery;" and the revelations which come out at times about sausage manufactories are certainly startling. Still on the whole they are fairly trustworthy, and their main adulteration is the bread crumb added. Ordinary English sausages are a good mixed food.

Then there are foreign sausages as Bologna, Strasburg, Gotha, Leberwurst, and the toothsome Gans Leberwurst made of the goose's liver. They are all savoury and many of them rich in fat. They are suitable for persons with defective teeth, as the meat has all been finely divided before being passed into the skin.

All sausages which contain the flesh of the pig, as well as bacon and ham, are liable to contain the Trichina Spiralis; which is only destroyed by proper cooking. Trichinosis is specially found where ham is eaten but little cooked, if cooked at all in some cases.

Potted meats are all savoury, from bloater paste up to *pâté de foie gras.* They are all liable to such manipulations as to allow one to say of them, "and things are not what they seem." *Pâté de foie gras* often contains but a suspicion of goose's liver, for instance. All potted foods, whether fish, flesh, or fowl, have of course been thoroughly disintegrated, and as such are suitable for dyspeptics. They do not usually form the *piéce de résistance* of a meal, but are savoury accessories. Little tiny sandwiches of stale bread, cut thin and the butter well rubbed in, and then some potted meat added, will often tempt a dainty appetite. Potted meats are usually highly salted; a mock *pâté de foie gras* made with larded calves' liver seasoned is a very nice food. All these potted foods are "relishes" rather than material articles of diet.

Pickled foods are preserved by vinegar or brine. All kinds of fish are pickled in brine, especially herrings. They require long soaking in water before the salt can be got out of them. Pickled pork is a great food with lumber-men and others who have to lay in stores of provisions. In the U. S. A. a winter with lumber-men with plenty of fresh air, exercise, and the fat pickled pork, is held

to be a grand preventive measure in threatened phthisis. Mussels and oysters are pickled in vinegar and are very pleasant forms of food. Dried and smoked meats are very palatable forms of food. Fish readily lend themselves to this process; kippered salmon are famous, and so are "kippers" a form of split herring dried. "*Findon* haddies" are well known, and equally so is the Yarmouth bloater. The dried haddock is unobjectionable; but the other forms are apt to upset the stomach, and can only be safely indulged in by persons who can trust their digestive powers. Kippered salmon broken up small (after cooking) and mixed with mashed potatoes, makes a capital fish pudding.

Dried fish of a common order were once the animal food of Europe in Lent. They require much soaking and have a low food value.

Anchovies are both dried and pickled as well as potted. An anchovy on a beefsteak imparts a pleasant flavour to it. Anchovies are usually related to hot buttered toast, and hence are not desirable for the dyspeptic. Caviare, the roe of the sturgeon, is not acceptable to all palates, but it has a high food value of albuminous character.

Tongues are often dried, and when soaked and boiled are good and palatable food. Cut thin across the grain, tongue is like ham as regards its tolerance by the stomach. The Russian tongues possess quite a game flavour.

Vegetables.—Sometimes vegetables are preserved by drying, as seen in the vegetable matter prepared for Julienne Soup. They are sometimes also compressed as stores for fleets and armies. They require soaking and then probably differ little from their kind in a fresh state. Many vegetable matters are pickled as relishes to food; notably the cabbage, the small onion, eschalots, gherkins, cauliflower, etc., all of which are trying to the digestive organs. Vegetables lend themselves readily to the tinning or canning process. Asparagus so treated has long been held in repute. The *petits pois* of France are miniature peas, not to be compared for a moment with the large marrowfat peas of American production. These last only require the addition of a little sugar when heating, to enable them to compete on fairly equal terms with fresh peas. Lima beans are also tinned and keep well. Succotash is a compound of the highly nitrogenised legume with maize and rich in fat. Maize in tins as "Sugar Corn" is a beautiful digestible dish, whether eaten with sugar and milk, or with butter, pepper and salt. The baked beans of New England hold a high position as a food, no matter from

what point of view they are looked at. Each tin contains a lump of fat bacon bigger than an egg. The beans are so thoroughly cooked and the fat intermingled with the material of the beans, by the high temperature at which they are baked (which is not without its effect upon the starch), that they readily disintegrate in the mouth; while the fat is in a form which gives little offence to the stomach. For food value, for cost, they stand very high. Further, they will come into vogue ere long with persons whose stomachs are fastidious about fat.

Vegetables are easily stored, and also are easily preserved in tins, as potatoes, carrots, turnips, beet, etc.

All *seeds* can be preserved dry, as those of the cereals and the legumes, and as such form a large portion of the food of man.

Fruits are variously preserved. As prepared with sugar by boiling they have been spoken of before. They are also bottled, and were at one time at least, largely adulterated with copper to secure a good green colour. Once a prudent man always put his penknife into green pickles and fruits, to see what amount of copper was deposited on the steel. Olives are largely bottled, they are usually eaten to clear the palate before drinking fine wines. They are rich in oil. Red fruits are apt to be stained by logwood, or beetroot juice to improve their colour.

Tinned or Canned Foods.—Tinned fruits are now in great favour. The apple, the pear, the plum, the grape, the quince, the cherry, the peach, and apricot, all tin capitally. They are welcome additions to the dinner table in winter and spring, either as they are or cooked. Tinned cranberries are far superior to the bitter astringent native cranberries of Great Britain.

Apple rings are also gaining favour with the housewife.

It may be said as a rule that vegetable products tin or can more successfully than fish and flesh.

Tinned salmon, though of good food value, lacks the flavour of the fresh salmon. Tinned lobsters vary very much, mostly according to the length of time the fish has been in the can. A good tin of lobster is not to be despised—when a fresh lobster is not at hand. And tinned salmon will pot, or make a good fish pudding mixed with mashed potatoes. Other fish, as turbot, cod, mackerel, tunny fish, pilchards, and herrings tin, and turn out fairly well.

The sardine preserved in oil is well known to everyone. It is a good fish food, and mixed with its oil, with a drop or two of Worcester sauce, is decidedly agreeable to the palate. No doubt many other

small fish get mixed with the sardines, but this scarcely constitutes adulteration.

There is one tinned fish, however, whose flavour is little affected by the tinning process, and that is the shrimp or prawn. The Barataria shrimp is delicious out of the tins.

Why the crab is not tinned—not the small soft-shelled crab which does tin—but the ordinary crab, is unknown to me. Probably there is some technical difficulty; also the eel, which would seem *a priori* to be well adapted for tinning.*

In Germany eels are pickled and sold in small barrels.

Tinned meats have established themselves over the face of the earth. Of course these tins of various sizes are most convenient for stores. A small quantity can be used at once—a great matter. Whether beef, mutton, or pork, as a rule, it may fairly be said the meat is overdone and stringy. Minced meat is fairly good and nice, and mixes well with mashed potatoes. Tinned tongues are really very good indeed; the flesh of the tongue seeming to lend itself to the preserving process very readily. Little sheep's tongues are decided delicacies, and so are tinned sheep's tails. The hare and rabbit tin moderately well. Turkey, goose, duck, fowl, and game, come out not amiss. Brawn is fair, and boar's head decidedly good. Pig's feet in tins eat capitally.

Venison I have not had a sufficient experience of, *i.e.*, in tins, to venture on an opinion.

N. B. One matter about tinned meats is never to be forgotten, viz.:—the contents of a tin should be consumed as quickly as possible after being opened. No food improves by keeping after being cooked, and this is specially true of tinned meats. They not only become unpalatable but even positively unwholesome; by using them up at once the most is made of them.

Milk is now largely preserved in tins, both Swiss and other milk. That such tinned milk is a great boon for town populations, and specially for young children, there can be no doubt. Even in the country where milk is not always as easily procured as some may think, the tin of milk comes in very handy.

Cream is more difficult to manage. Partially desiccated—as Devonshire Cream, it is well-known all over England. Cream is a

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* The same may be said of the mushroom, which I have never encountered in a tin—except the small French buttons, which are indifferent food from any point of view.

highly nutritive body, very rich in fat in an emulsionised form. Some time ago I wrote to the *New York Herald* suggesting the tinning of cream. An enterprising man in Iowa sent me many samples; some tins turning out well, but many unfit for food. But the thing could never be relied upon, and so was commercially a failure. A Dutch firm seems to have been more successful by an Exhibit in the Inventories (1885).

The products of milk, however, as butter and cheese, keep admirably. When butter has to be kept, some salt is added, and how long salted butter will keep is unknown. It is a most digestible fat; though of course, the object of churning is to get the fat out of its emulsionised form. It is largely used eaten to bread, and is invaluable to the cook for her dishes and her pastry. Melted butter is eaten to fish, and adds highly to its nutritive value. Butter is dear comparatively; but it is an item of household expense that should never be grudged.

It is a great mistake to cut "nursery" bread-and-butter thick; if the butter be sparingly applied there is not enough of it; if spread thick it revolts the stomach with delicate children of feeble digestive capacity. The bread should be cut thin and the butter rubbed well in, and then any child can eat it readily—yes, and digest it too! Bread-and-butter puddings are capital food.

Cheese is a form of food requiring some consideration. It has the reputation of being most indigestible:

> "Cheese is but a peevish elf,
> Digesting all things but itself."

This applies to the highly flavoured cheese eaten as the last course at dinner. A nip of ripe Gorgonzola, or Rochefort, or Camembert, or Neufchatel, or even Stilton, Cheddar, Cheshire, or double Gloucester, after dinner provides a fatty acid which aids the emulsionising of fat in the alimentary canal. But this is scarcely the consideration of cheese as a food. Cheese is largely eaten as a blending of food and relish, by persons with whom economy is a matter of moment. It is either eaten as it is, or cooked. At one time every farmer made his own cheese, for home consumption at least. Now cheese-factories make, as a rule, so much better cheese at a moderate price that cheese-making is no longer general with farmers.

A skim milk cheese was a tough affair, but a highly concentrated form of albuminous food. A cheese made of fresh milk, contains a large proportion of fat, while "cream-cheese" contains little casein.

Casein softens under heat, and toasted cheese, or Welsh rarebit are sapid and savoury morsels, soon falling away if kept hot; indeed it is well to wait a little for them rather than to keep them waiting. They are reputed to be indigestible, and certainly are so with some persons. Other stomachs, again, tolerate cheese; and there are born "cheese-eaters" as well as "cheese-haters," to the one cheese is a poison, to the other it is most acceptable. To the latter even when dyspeptics, cheese need not be forbidden. A great matter is its disintegration. Finely grated in soup or even boiled macaroni it is unobjectionable. Macaronic cheese done in the oven, or before the fire requires stronger digestive powers. If hominy be well boiled, and then grated cheese with milk mixed with it, and the whole put into the oven to brown, a delicious digestible dish is the result. Crushed cereals, shredded maize, samp and broken biscuit so treated with milk and cheese, are admirable foods of high food value, savoury, and finally, digestible.

Cold cauliflower and vegetable marrow served up with cheese *au gratin* are very good; while Staffordshire folk fry cheese with bacon, and for this end prefer a crumby cheese—not otherwise in favour for culinary ends.

CHAPTER IX.

PREPARED FOODS.

By "prepared foods" here is meant the foods which are sold for babies and invalids. To Liebig, among so much more relating to food, we owe the introduction of foods specially prepared for infants. The food of the newly-born is milk; but many attempts have been made to substitute for it, mainly or in part, other foods; the motive being in some cases economy, in other cases the difficulty of procuring milk in sufficient quantities. Sometimes the mother could not suckle the child, being ill, and sometimes dead.

By what instinct persons were led to choose the crust and sole of the loaf to boil for babies' food, can now only be a matter of speculation. After thorough boiling the water was poured off more or less completely, and some milk added. The outside of the loaf is the part most thoroughly exposed to the baking process, and therefore in it the starch is most completely converted into soluble dextrine. Such carbo-hydrate matter with some fresh cow's milk formed a very complete food. But such "pobbs" with only a little sugar in, is a poor food; and the marvel is that such lusty infants ever were raised on "pobbs" as undoubtedly have been the case in the agricultural districts of England and elsewhere, where milk is not easily procured. How, and by what means the growing organism has secured materials for tissue-growth out of this unpromising food, is a mystery, when looked at from a scientific point of view. Then came rusks and "tops and bottoms," all however, made with fine flour, and lacking the salts and albuminoids of the bran. Then came the introduction of malted preparations.

Something has been said before about the preparation of malt-extracts, and this need not be repeated here. The wort is evaporated down to the consistency of honey, and is a sticky and troublesome food to handle; albeit a beautiful food. As a mere food, without any diastasic activity, a dry preparation like Mellin's is in every way preferable. There are dozens of such foods in the market, and very good foods they are, too. They are especially desirable added

to milk for adults as invalids and dyspeptics, and to a little milk and water for babies.

Combinations of baked flour and malt are now sold by the hundred as babies' and invalids' foods. They vary somewhat in composition. Some contain more malt than others; some contain some desiccated milk. No doubt these last are the most complete foods, as from the milk a certain amount of fat is present. They are also most palatable.

Pure malt in fine powder must soon be a regular article in the market. It is economical as compared to the malt-extracts, fluid or dried, and contains much more diastasic activity. Added to baked flour in quantities varying from one-third malt flour to two-thirds of baked flour, up to half and half, and then hot milk either poured on—(for a pudding) or added for a drinkable food, malt can be made most useful. Ground malt, too, contains the husk of barley and is rich in phosphates. Maltose, dextrine, soluble albuminoids, and phosphates, all are there in a very palatable form. Only fat is lacking. And that can be got too, in the cremor hordeatus, and in oleobyne; both of which contain milk-fat in considerable proportions.

The ordinary prepared foods in powder are legion. There is one good thing about this, and that is, there is choice and variety. One form is unpalatable to a baby or invalid, while another pleases the palate. The palate grows tired of one food, then try another for a change. Monotony is the curse of all dieting, and should be avoided as far as possible.

A medical man should not be wedded to one food, but should be more Catholic-minded. This is a matter far too little considered, and yet it lies across the very threshold of resort to prepared foods. Change about from one to another just as you expect your cook to cater for yourself.

Say for breakfast the invalid has some milk and Mellin's food; at eleven o'clock some whole beef tea with baked flour in it; at luncheon a milk pudding, made with broken captain's biscuit, or other biscuit; at tea-time some chicken broth with shredded maize; and at supper a digestive biscuit and butter with a glass of sherry. By attention to these items—but very important items—the invalid's dietary could be made acceptable instead of revolting, as it too often is.

When I read of Dr. David Yandall fasting when ill with typhoid fever, I knew Mrs. Yandall's capacities as a housewife too well to suppose for one moment that monotony in food was the cause of his

RY INSTITUTE,

sting; and that his conduct would cause dire domestic grief. But any an invalid hungers, partially at least because he does not get riety. Variety indeed is quite as acceptable to the invalid and the speptic as to anyone else; and babies no doubt have their choice bout food just as much as their elders. Because the poor little thing cannot tell us what it thinks, it is not therefore necessary to assume that it has not its thoughts, and these it communicates by its rejection of one food and its delight in another. A very young baby can reason. I remember once seeing a youthful mother nursing her first baby, and putting the mouth-piece of her feeding bottle in the baby's mouth and wondering why it would not suck. The baby got nothing but air when it did suck, and so abandoned the effort; it did not want air; it wanted milk! On directing her how to have the teat filled with milk before putting it in the baby's mouth, it sucked away famously, and developed into a lusty child promising to grow up into an astute Yorkshireman. So with the prepared foods, one baby likes a good share of malt in the "food," while another prefers a certain food in which there is little or no malt; while another again delights in a food in which there is a certain admixture of leguminous flour. Tastes they have, of course, and preferences—like other and older folks!

And of course the same individuality of taste and palate belongs to dyspeptics and invalids. Because one form of prepared food is distasteful, it does not follow that all are. If there existed a little more inventiveness in nurses there would not be so much complaint of monotony of food on the part of sick persons. When the *menu* consists solely of milk and seltzer water, beef tea and calves' foot jelly, is it any wonder that the palate is palled? And yet this is the complete range of invalid cookery in many households. Not long ago I was in company with three general practitioners—two, fair good average specimens and one decidedly far above the average, and they could go no further. It was only too clear that they were not in a position to afford much suggestion as to the dietaries of their patients. They all answered "slops" to my leading question: but their acquaintance with "slops" in concrete forms was limited. Yet there was no reason to suppose them specially ignorant beyond their fellows.

Every medical man ought to try the various prepared foods in various ways, so as to personally understand what he is talking about when speaking of various foods. Otherwise he is but a "dumb dog" on the subject. I wish my acquaintance with the

prepared foods of the United States was anything like as extensive as my knowledge of the prepared foods of Great Britain, for then I could speak freely on the different forms. To mention those I happen to know, would exclude many of which I have never heard, which may be equally good.

All sweet foods containing malt go best with milk; while plain baked flour suits best meat-infusions. Lentil preparations have a strong flavor whatever mixed with. Pea flour is best with meat-infusion as the "brose-meal" of Scotland. The highly nitrogenised character of all leguminous flours renders them suitable rather for the hale than the sick. And much the same may be said about oatmeal, as it does not agree as a rule with a sick stomach. Its richness in fat has something to do with this, and a fatty acid is apt to be brewed therefrom in many stomachs. It is the fat in oats and maize which makes them objectionable with many. Rye is a pleasant addition to wheaten flour to the fancy of many, as seen in the pumpernickel of Germany, and the brown loaf of the North of England, especially in the farmhouses, where brown bread and skim milk cheese are large factors in the dietary.

Prepared foods, which contain a certain proportion of desiccated milk, have a high food value, and require only water (with a pinch of salt) for their culinary treatment.

There is one form of prepared food which is, so far, unique, and that is the cremor hordeatus of Loefflund, which is made from the best cream from selected herds on the Bavarian Alps, deprived of a certain amount of water and preserved by malt extract. This highly palatable food is excellent in its food properties. It contains some albuminoids, a considerable quantity of fat, and some carbo-hydrates. It can be eaten alone, and in certain cases where the stomach is irritable and contracted, so that only small quantities of food can be tolerated, a piece the size of a hazel nut may be taken every hour. For an invalid in bed this is quite sufficient to keep up the strength until the stomach is well enough to hold a larger bulk at once. Or it can be used to coffee or tea, and is especially indicated in those cases where cane sugar gives rise to acidity.

Of like character in the main, is the new food called "oleobyne," which as its name indicates is a compound of fat and malt. It also is very palatable, with a high food value. Its fat is in an emulsionised form, and therefore very digestible. Such foods are adapted to persons whose tissues require more fat and yet who dislike cod liver oil,—a very large community. For persons of phthisical ten-

dency these foods are suitable, while they keep well. Persons likely to be thrown much upon a meat dietary, as on hunting expeditions, should make these foods part of their stores. They also are indicated for persons with incipient Bright's disease, as not being too highly charged with nitrogen. Another admixture of oil and malt is "kepler," where the oil is incorporated with malt extract.

Then there are cod liver oil emulsions to be considered. These, of course, contain only fat, and that in the form of oleine—the most digestible, but otherwise, probably, the least valuable form of fat. Good cod liver is frozen to get out the stearine, and as much of the palmitine as possible, the remaining fluid being very pure oleine. Such fat is often digested when other fats, as animal fat and butter, are rejected. Nothing is easier than to make an emulsion with any fat, suet, or oil. But the difficulty is to make an emulsion that will keep an indefinite time. If a pancreatic preparation is used, the tendency is, for the ferment to act upon the fat, and split some of it up into fatty acids,—matters very irritant to the stomach and not especially welcome to the palate. There are many such preparations to be bought; and when they are readily procurable can be bought as required in a fairly new and fresh state.

There has been a prejudice, and a strong one too, abroad about prepared foods. First announced as "baby-foods" and used for infants, the public did not seem to notice the "and invalids," which in many instances follows the "babies." Advancing knowledge is, however, breaking down this prejudice, albeit slowly. A more general recognition of the value of soluble carbo-hydrates, other than cane or beet sugar, on the part of the medical profession, is desirable; and when systematic lectures on food and dietetics are given, every young medical man will understand the value of pre-digested farinaceous matters, and their fitness as food in all cases of weakly digestion. Grape sugar is the food of the body and must be supplied to a certain extent every day. Undigested starch hampers the stomach and prevents its getting on with its own proper work. Prepared foods with pre-digested starch must come more into vogue, the digestive powers fail under the mental strain of the present time, and the still greater strain of the future. Prepared cereals of all kinds that have been subjected to a high temperature, and prepared foods of farinaceous origin, must largely take the place of raw flour in the kitchen. Soluble preparations of meat, that is where the muscular fibre has been thoroughly disintegrated, admit of considerable quantities of soluble carbo-hydrates being added to them.

By varying the soluble meat and the carbo-hydrates, variety can be got, if not a very wide range. Then where the stomach resents fat floating about in it when at work, the fat can be taken when the gastric activity is over, as cream, or emulsionised fat artificially prepared. Such a scheme of dietary is not very attractive; but then we all know that we must cut our coat according to our cloth —not according to our liking.

CHAPTER X.

ARTIFICIAL DIGESTIVE AGENTS.—ARTIFICIALLY DIGESTED FOODS.

Necessity is the mother of invention, says the old saw. And failure of the digestive powers has led to the adoption of artificial digestive agents. First the chemist seized upon the diastase of the seedling to help our human saliva. Then he appropriated the digestive agent in the pig's stomach and utilized it for the needs of man. Hence pepsin in its various forms. Finally on discovering the functions of the pancreas, that viscus was enlisted as furnishing a most useful recruit to the ranks of the artificial digestive agents.

Of the action of diastase upon starch, enough has been said, both as to its action and how to make use of it in practice. No more requires to be said. The diastase, or rather the matter containing it, can be added to the starchy food; 1, before being taken into the mouth; or, 2, while being taken into the mouth; or 3, immediately after the food is swallowed so as to act before the stomach becomes too strongly acid for its operation.

Pepsin is an agent which acts in an acid medium, and exercises its digestive qualities upon albuminoid materials solely. It is put up in a fluid form, in the powder, in pills, and in tablets. It is impossible to express any opinion upon the respective merits of the different forms. The matter is to secure a good and potent preparation. The pills and tablets have the advantage of being readily swallowed. The palate is not offended, that is one matter. Then there is another. There are many persons whose digestion needs a little help, who are yet well enough to visit and dine out, and it is under these circumstances that some artificial digestive aid is most necessary. A bottle of fluid is out of the question here, but a few pepsin pills or tablets can easily be carried about; and one or more taken at the table without attracting attention. For such end pepsin pills and tablets are admirably adapted, and are accordingly much patronized. Indeed by such means and measures many persons are enabled to dine in company without attracting attention either by the rejection, or careful selection of their food, or by obvious resort

to digestive aids;—both exceedingly unpleasant for nervous persons, who are very liable to be dyspeptic.

Where a meal is taken alone, it is a matter of comparative indifference in what form the pepsin is used.

Then come pancreatic preparations of all kinds and varieties. So far, we have been most familiar with the fluid preparations recommended by Sir William Roberts, F.R.S., of Manchester. The pancreatic fluid has a large range of digestive activity. It transforms starch into grape sugar; it digests albuminoids (in an alkaline medium); it curdles milk, and it emulsionises fat. The difficulty about it is, however, that it is inoperative in an acid medium. The acid stomach lies betwixt the mouth and the duodenum—the area where the pancreatic secretion exercises its action. Dr. Roberts met this difficulty by placing his Liquor Pancreaticus under the protection of an alkaline guard, in the form of 10 or 20 grains of bicarbonate of soda. But the soda has a filthy taste, and renders the draught most offensive to many palates. It has seemed to me, instead of soda and water, it is well to give the pancreatic ferment in a glass of milk with as much prepared chalk, or light magnesia as would lie on a sixpence—about the size of a male thumb-nail. This is a far less outrage on the palate. It is a preferable form of alkali to my mind. By waiting until the acidity of the stomach is exhausted ere giving this draught, less alkali is required, and the result is more certain. The acidity of the stomach wanes as gastric digestion reaches its completion; and there is little acid left to neutralize about an hour and a half or two hours after a meal. This is the time to select for the artificial pancreatic digestive agent to help out the natural pancreatic secretion.

The same principle of action must guide us in the use of pancreatic agents whatever their form: and other than fluid preparations are already being manufactured.

Combinations of the several digestive agents on the "shot-gun" principle are largely sold. Unphysiological as they appear they certainly are often useful. "If the one misses, t'other hits." That is the principle. If the contents of the stomach be still acid, then the pepsin comes in useful. If the food be passing the pylorus, and coming into contact with the alkaline chlorides of the bile, then the pancreatic products are ready for action.

Such then are in brief, the artificial digestive agents.

Now as to predigested foods. Enough has been said about predigested starch.

Next come peptonised foods. These when made with beef, as a rule, are nauseous. They outrage the palate. They may be useful, but my experience has been against them. Of course this does not involve the conclusion that the experience of others has not been more favorable to peptonised foods. Peptonised milk is not very objectionable, even in tins. If prepared peptonized foods could only be made palatable, they would be a great boon when the stomach is deranged or enfeebled—either as a local malady, or as part of a general state of weakness.

But here a caution is necessary: A distinction must be drawn between cases where the stomach is at fault, and those where the liver is to blame. In states of primary indigestion where the conversion of proteids into peptones—that is, digestion in the alimentary canal—is at fault or defective, then these artificial digestive agents are most useful. But where the fault lies outside the alimentary canal and with the liver and its accessories—that is, where the soluble peptones are not changed back into proteids (and so escape by the kidneys) or when the liver does not carry on the metabolism, or elaboration of the albuminoids borne to it by the portal current, but transforms them into a descending series of nitrogenised substances, of which white lithates present in the urine about three hours after a meal is the evidence (J. H. Bennett), these artificial digestive agents do not meet the difficulty. In the latter case the liver has to be dealt with directly.

Another matter presents itself to my mind at this point, and that is—valuable as artificially digested food undoubtedly is, in my experience—and I enjoy some reputation as an authority on indigestion and biliousness—it is not well to resort to them at once, or until other measures have been resorted to and tried. Many patients come to me who have been fed on artificially digested food, where they can digest suitable food very fairly well. I shall never forget a Nottinghamshire farmer bringing his son, who had been largely fed on predigested food. "It's making a pauper of his stomach, Doctor!" he argued; and as a rate-payer he knew paupers would never work, if they could help it! My own plan is to give suitable and easily digestible food with some artificial digestive agent, and if necessary administer a nutritious enema, night and morning, and to encourage the natural digestive powers to do their own work. It may become necessary to fall back upon predigested food, but this is rarely essentially necessary. It may be, however, in conditions of great gastric enfeeblement, until the power of digestion is regained —after which it is well to drop resort to them.

Some description of them becomes essential, as there are cases where they are required. But whether great gastric irritability existing is an indication for their use is a moot matter. I am not aware that it is pleaded that peptones sit more easily upon the stomach than proteids, though it may eventually turn out that such is the case. Here it is rather a question of bulk than of anything else. Small quantities at once of whole beef tea, with some baked flour, malt extract, or milk with or without some soluble carbohydrate, should be tried. Especially in gastric catarrh is this desirable. If anything approaching solid food be taken then, as it is rolled over in the stomach, it becomes coated with mucus, and so forms an utterly indigestible mass. Here peptonised milk may become useful as no longer undergoing or requiring the curdling which might transform ordinary milk into something of a solid. In gastric ulcer predigested food would pass readily through the stomach and occasion little movement, and would do away with the pain caused by the muscular contractions dragging on the base of the ulcer. The presence of the acid of the gastric juice irritates the raw surface, and vomiting relieves the stomach at once of both acid and movement, and so immediate ease follows. The circumstances under which resort to predigested food is indicated, can only be broadly spoken of here, and must in each case form the subject of private judgment upon the part of the medical attendant. After such cautions and qualifications, some account may be given of the means of preparing them; following upon the lines laid down by Sir William Roberts.

The Preparation of Peptonised Foods.

In peptonising, or partially digesting food by means of Liquor Pancreaticus, it is important to remember that the liquor must not be added to food of any kind at a higher temperature than 140° Fahr. This temperature can be estimated with sufficient accuracy, should no suitable thermometer be at hand, by tasting. If too hot to sip without scalding the mouth, it would entirely destroy the activity of the liquor pancreaticus, and must be allowed to cool to that point before such addition is made. This rule will hold good with other pancreatic preparations.

Peptonised Milk.—A pint of milk is diluted with a quarter of a pint of water, and heated to a temperature of about 146° Fahr., (60 C.). Or the diluted milk may be divided into two equal portions, one of which may be heated to the boiling point, and then added to

the cold moiety; the mixture will then be of the required temperature. (We are not told what is the temperature of the cold portion, but we may assume it is below 80° Fahr.) Two or three teaspoonfuls of liquor pancreaticus, together with ten or twenty grains of bicarbonate of soda (about half a small teaspoonful) are then mixed therewith. The mixture is then poured into a covered jug, and the jug is placed in a warm situation under a cosey to keep up the heat. At the end of an hour, or an hour and a half, the product is raised to the boiling point for two or three minutes in order to arrest any further digestion. It can then be used like any ordinary milk.

The object of diluting the milk is to prevent the curdling which would otherwise occur, and greatly delay the peptonising process.* The addition of bicarbonate of soda prevents coagulation during the final boiling, and also hastens the process. The purpose of the final boiling is to put a stop to the ferment-action when this has reached the desired degree, and thereby to prevent certain ulterior changes which would render the product less palatable. The degree to which the peptonising change has advanced is best ascertained by the development of a bitter flavour. The point aimed at is to carry the changes so far that the bitter taste is distinctly perceptible, but is not unpleasantly pronounced. The extent of the peptonising action can be regulated either by increasing or decreasing the dose of liquor pancreaticus or by increasing or decreasing the time during which it is allowed or permitted to operate. By skimming the milk beforehand, and restoring the cream after the final boiling, the product is rendered more palatable and more milk-like in appearance.

Peptonised Gruel.—Gruel may be prepared from any of the numerous farinaceous articles which are in common use,—wheaten flour, oatmeal, arrowroot, sago, pearl barley, pea or lentil flour.†

The gruel should be well boiled and made thick and strong. It is then poured into a covered jug and allowed to cool to a temperature of about 140° Fahr. Liquor pancreaticus is then added, in the proportion of a tablespoonful to a pint of gruel, and the jug kept warm under a cosey as before. At the end of a couple of hours, the product is boiled and finally strained. The action of the pancreatic extract on gruel is twofold; the starch of the meal is con-

* May not the matter go far to explain the ready digestibility of milk diluted with an alkaline water as compared to plain milk?

† In accordance with what has been all along insisted upon, farina which has already been exposed to a high temperature is to be preferred—even here.

verted into sugar, and the albuminoid matters are peptonised. The conversion of the starch causes the gruel, however thick it may have been, at starting, to become quite thin and watery. Peptonized gruel is not generally, by itself, acceptable food for invalids, but in conjunction with peptonised milk (peptonised milk-gruel) or as a basis for peptonised soups, jellies, and blanc-manges it is likely to prove valuable.

Peptonised Milk Gruel.—This is the preparation with which Dr. Roberts has had the most experience, and with which he has obtained the most satisfactory results. It may be regarded as an artificially digested bread and milk, and as forming by itself a complete and highly nutritious food for weak digestions. It is very readily made, and does not require the thermometer. First, a good thick gruel is prepared from any farinaceous material. The gruel while still boiling hot, is added to an equal quantity of cold milk. The mixture will have a temperature of about 140° Fahr. To each pint of this mixture two or three teaspoonfuls of liquor pancreaticus and twenty grains of bicarbonate of soda, (half a small teaspoonful) are added. It is then kept warm in a covered jug under a cosey for a couple of hours, and then boiled for a few minutes, and strained. The bitterness of the digested milk is almost completely covered in the peptonised milk-gruel,—and invalids take this compound, if not with relish, without the least objection.

Peptonized Soups, Jellies and Blanc-manges.—Dr. Roberts has sought to give variety to peptonised dishes by preparing soups, jellies, and blanc-manges, containing peptonised elements. These contain a large amount of digested starch and albuminoid matter, while possessing excellent flavour, and which the most delicate palate could not accuse of having been tampered with. Soups were prepared in two ways. The first way was to add what cooks call "stock" to an equal quantity of peptonised gruel, or peptonised milk-gruel. A second and better way was to use peptonised gruel, which is quite thin and watery, instead of simple water for the purpose of extracting shins of beef and other materials employed for the preparation of soup. Jellies were prepared simply by adding the due quantity of gelatine or isinglass to hot peptonized gruel, and flavouring the mixture according to taste. Blanc-manges were made by treating peptonised milk in the same way, and then adding cream. In preparing all these dishes it is absolutely necessary to complete the operation of peptonising the gruel or milk, even to the final boiling before adding the stiffening ingredient. For if liquor

pancreaticus be allowed to act on the gelatine, the gelatine itself undergoes a process of digestion, and its power of setting or cooling is utterly abolished.

Peptonised Beef Tea.—Half a pound of finely minced lean beef is mixed with a pint of water and twenty grains of bicarbonate of soda. This is simmered for an hour and a half. When it has cooled down to 140° Fahr., a tablespoonful of the liquor pancreaticus is added. The mixture is then kept warm under a cosey for two hours, and occasionally shaken. At the end of this time, the liquid portions are decanted, and boiled for five minutes. Beef tea prepared in this way is rich in peptones. It contains about 4.5 per cent. of organic residue, of which more than three-fourths consist of peptones, so that its relative value in regard to nitrogenised materials is about equivalent to that of milk. When seasoned with salt it is scarcely distinguishable in taste from ordinary beef tea.

Another way.—One pound of finely minced lean beef is mixed with one pint of water, and simmered for an hour and a half. The resulting beef tea is then decanted off into a covered jug. The undissolved beef residue is beaten with a spoon into a pulp or paste, and added to the beef tea into the covered jug (whole beef tea). When the whole is cooled down to 140° Fahr. (or when it is cool enough to be tolerated by the mouth) a tablespoonful of the liquor pancreaticus is added, and the whole well stirred together. The covered jug is then kept warm under a cosey for two hours, at the end of this time the contents of the jug are boiled briskly for two or three minutes, and finally strained, it is then ready for use. The extreme solubility of digested products, whether starch or albuminoids, detracts from their acceptability to the healthy. To them they appear thin and watery, they miss the sense of substance and solidity, which is characteristic of their ordinary food. But to the weak invalid without appetite, this sense of substance or thickening is generally an objection, and they take with more ease an aliment which they can drink like water. When some improvement has been made, then the soups and jellies and blanc-manges are relished.

The Use of Liquor Pancreaticus as an Addition to Food shortly before it is Eaten.—Certain dishes commonly used by invalids, farinaceous gruels, milk, bread-and-milk, milk flavoured with tea, or coffee, or cocoa, and soups strengthened with farinaceous matter, or with milk, are suitable for this mode of treatment. A teaspoonful or two of liquor pancreaticus should be stirred

up with the warm food as soon as it comes up to table. And such is the activity of the preparation that, even as the invalid is engaged in eating—if he eat leisurely as an invalid should—a change comes over the contents of the cup or basin; the gruel becomes thinner, the milk alters a shade in color, or perhaps curdles softly, and the pieces of bread soften. The transformation thus begun goes on for a time in the stomach, and one may believe that, before the gastric acid puts a stop to the process, the work of digestion is already far advanced.

The food should be cool enough to sip before the Liquor Pancreaticus is added, else the ferment is killed.

Peptonised Enemata.—Such peptonised milk-gruel as has been described, is admirably adapted for enemata. Here the palate has not to be considered, and monotony is not distasteful. Peptonised beef tea, with some soluble carbo-hydrate may be used at times. But the fat in the milk makes the milk-gruel more desirable, in theory at least; for how far fat can be taken up by the large bowel is a matter on which the writer knows nothing personally, nor, on enquiry, can he find anything to favor the view of fat-absorption by the large intestine.

There lies no objection to peptonised preparations for enemata on account of their taste, and an enema of peptonised beef tea, with any of the prepared foods consisting of soluble carbo-hydrates, would be easily prepared in any household, however humble.

There are other preparations than fluid pancreatic preparations, and the following are from the instructions furnished by Messrs. Fairchild. This form has its pancreatic preparation in the form of a powder—*Extractum Pancreatis.* It is sold in glass tubes, each containing five grains of the Extractum, and fifteen grains of bi-carbonate of soda. (They are sold in boxes of one dozen). The contents of one tube will digest one pint of milk in half an hour.

The procedure is simple:—"Into a quart bottle pour a pint of milk, a quarter of a pint of water, and one peptonising powder. Let this stand for thirty minutes in water as hot as the hand can bear, and then boil for two or three minutes. It is then ready for use, and should be kept in a cool place."

Instead of testing the temperature by sipping,—Dr. Roberts' plan—Messrs. Fairchild prefer the hand; either is a good and ready test. From the evidence Messrs. Fairchild have been able to collect, they are strongly of the opinion that peptonised food is more readily borne and tolerated by the stomach than food not predigested. They

say of peptonised milk—"It is retained in diseased conditions, especially of the digestive tract, when everything else would be rejected." Time will tell if this sanguine view is well founded. For the peptonising of meat their directions are: "To half a pint of whole beef tea and half a pint of water, thirty grains of Extractum Pancreatis, and twenty grains of bicarbonate of soda, and keep in a warm place not over 140° F., for three hours, and then to boil—to kill any remaining activity in Pancreatic Extract." Soda seems as essential to the action of trypsin as acid is to the action of pepsin.

The use of peptonised foods became very extensive, soon after Sir William Roberts introduced them to the notice of the public; but the demand is now much less. Why is this? Probably one matter is that those practitioners who love to dabble in the very latest novelty, had peptonised food prepared in many cases where ordinary food would have served equally well, and so gave the friends and nurses of many invalids a great deal of unnecessary trouble. Then other novelties cropped up and hustled peptonized foods out of the memories and minds of the said novel-hunting practitioners. That is part of the explanation. Another part is that the resultant products were not palatable, because the instructions were not rigidly carried out. A fine instrument in the hands of a careless fellow is soon put out of working order; and the finer the instrument, the sooner disaster is induced. The method of peptonising food is a matter of precision, 1st, the right temperature —high enough to permit of the ferment readily acting, and yet not too high to kill it. If too high no peptonising is possible, if too low the digestive agent is inoperative, and no peptonising follows. 2d. The neglect of raising the fluid to the boil at the proper time. "The hotter the oven the shorter the time," is an axiom in cooking. If the fluid was kept warm under the cosey the time to raise it to the boil comes earlier than it does when some cooling occurs. If the time to raise it to the boil is delayed, then the bitter taste of complete digestion is brought out, and so the resultant product is offensive to the palate.

It is easy to see how carelessness, or perhaps to be more just, how the want of careful exactitude led to disuse of peptonised foods. If these were only used when it is understood that the case is serious, it would follow that proper care would be taken. Abuse readily follows upon use, and dabbling in peptonising food to gratify a curiosity or keep somebody out of worse mischief, has brought a valuable measure into disrepute, aand consequently, disuse.

In ordinary cases, predigested carbo-hydrates are enough with whole-meat broths, and milk with seltzer water, in small quantities at once, alternating with malt-extract for variety. If such dietary is insufficient, and life is quivering in the balance, then some responsible person must be put on to do the peptonising, with a full sense and consciousness of the grave responsibility of his or her action. If this were done, then the practitioner could rely upon his weapon as being well forged and trustworthy. But to set a meddlesome fool to work peptonising food, is to inaugurate a solemn farce, and if the case be really a grave and serious one, such procedure is little less than manslaughter, and deserving of the most severe censure. If a medical man does not possess sufficient acumen to discriminate his agents, he is not fit for the post he has assumed. And if he cannot exact military obedience from his subordinates, he should dismiss them from the service, as a General does an incompetent soldier; and if he cannot do that, he should dismiss himself from the generalship of the case—and his resignation would be the best plan for all concerned.

With proper care and precautions, peptonised foods are a most valuable aid in many cases, especially where there is any morbid condition of the stomach present. They require little or nothing of natural digestion, and sit easily on the stomach; but then such food requires to be made with as much care as is requisite in putting together the works of a watch—if it has to go well.

An attempt to provide a peptonised preparation which only requires some hot fluid, and so dispense with household peptonising, has been made in "Soluble Food."

With this last remark, which indeed applies broadly to all culinary preparations, but specially to peptonised foods, Part I. of this work fitly concludes. A knowledge of what food is, of what it consists, chemically, of its destiny in the body, of the effects of cooking, and the different portions of the digestive act, must constitute the basis or foundation of all dietetics, and must be thoroughly mastered in detail before the actual dieting of a sick person can be safely approached. It is the want of such knowledge which has hitherto hampered the profession in dealing with the matter; leaving each practitioner single-handed to follow his own experience—an experience often leading him in a manner which reminds me of a clergyman's answer when asked if a certain parishioner followed his conscience,—"Oh yes," was the reply, "he follows his conscience very much in the way he may be said to follow his horse—when he drives

it in front of him!" A man, to some extent, makes his experience as he goes, tentatively, on certain lines laid down, but laid down how? The fashions which have swayed the dietary of the sick room, demonstrate that no guiding principle was in action in this matter. Veal broth and eel broth had yielded to calves' foot jelly, when my professional experience first began; then that gave way to milk and seltzer water, over which beef tea usurped a baneful tyranny which it still holds. But the facts are slowly undermining its rule, and common sense, illumined by scientific knowledge, is bombarding its fortress, and, before long, we may fairly hope, its ill-founded pretensions to be a sustaining food will be abandoned, and a safer and sounder position taken up, viz.:—that it is (as ordinarily prepared) a stimulant vehicle, pleasant to the palate for soluble carbohydrates—no mean position by any means for it to hold! Error is knowledge in the making, and "knowledge grows, but wisdom lingers," as is evinced in a piece of instruction in a medical journal which came under my notice, while penning this chapter. Shellfish there is advocated as a food for the diabetic, and especially oysters. Now the great bulk of the oyster (like some other shellfish), consists of its liver, which is crammed with glycogen, or animal starch. How such a curious and pernicious error could have found its way into a respectable medical journal, is one of those things which Lord Dundreary decided "No fellow can understand." When dietetics are properly taught in our medical schools, and each medical student is made to understand the chemical composition and utility of each article of our dietary, as carefully as he is taught the action of each unit of the Pharmacopeia, he will handle his food as skilfully as he wields each medicinal agent. And then, when he can do this, he will achieve results which may agreeably surprise others as well as himself.

Every sick person is a dyspeptic for the time being; and whether it is the dyspepsia of acute disease, or of chronic disease, or of trouble conected with the stomach itself, the medical practitioner has daily to encounter impaired digestive power—*i.e.*, if he has any patients at all! And a knowledge of dietetics is as desirable as is acquaintance with Materia Medica; and Therapeutics can no more neglect one or the other, than a ladder can consist of one side-piece and rungs.

PART II.

CHAPTER XI.

FOOD IN INFANCY.

HAVING discussed the subject of Food, in its entirety, it now becomes possible to enter upon the practical application of this knowledge.

When the babe is newly born it was, and in some cases may still be, customary to put something into its mouth; commonly some sugar and butter.

The child had had a long fast, it was pleaded, and the welcome to the little stranger could best take the form of some nourishment. The motive was good, at any rate. "At birth the stomach and bowels, not having been used for the purpose of digestion, contain a quantity of mucous secretion—meconium—which requires to be removed before they can enter upon their function. To effect this object Nature has rendered the first portion of the mother's milk purposely watery and laxative; and on the part of the infant nothing further is required than to allow it to follow its natural instinct and suck it in." So says Dr. Andrew Combe in his famous treatise on "Digestion and Dietetics." Laxatives, other than this, are not required. He has some more remarks which seem to me to be worth quotation.

"At birth the stomach is feeble and as yet unaccustomed to food. its cravings are consequently easily satisfied, and frequently renewed. A healthy infant seeks the breast with avidity, but sucks little at a time. It leaves an interval for thoroughly digesting the little which it has swallowed; after which its appetite revives, and a fresh supply is demanded in language which no mother can misinterpret. During the first month appetite ought to be the mother's guide in offering the breast, and if she know how to read the expression of her infant aright, she will want no other. At that early age there ought to be no fixed time for giving nourishment. The stomach cannot

be thus satisfied. In one child digestion may be slow, and the interval be consequently too short; in another it may be quick, and the interval too long. But the active call of the infant is a sign which need never be mistaken, and none else ought to be listened to."

Overfeeding is, however, the danger *par excellence*, he holds; and most of the troubles of early infancy are due to this, as colic, bowel-irritation and diarrhœa. The carminatives, aromatics and antacids, so frequently given to infants are required mainly in consequence of errors in feeding. We must not put out of sight, however, the fact that any derangement of the maternal health, any improper food on her part, even a mental emotion may so affect the milk as to alter its qualities. This is a well-known fact with mothers. Further, if a child is constipated, the pleasantest method of correcting the bowels is to give some mineral laxative to the mother; and of all these the phosphate of soda suggests itself on physiological grounds. The dose to be given to the mother which is sufficient to influence the child is usually not so large as to affect her much. The mother's milk is usually quite sufficient for the first nine months of existence. Nor need the mother be specially fed for the purpose of sufficient lactation.

Of old, if the mother was removed by death or from any reason rendered unequal to suckling her babe, a wet-nurse was procured. For the purpose, a mother in a humble position of life was usually selected. But "the health and usefulness of country nurses are often utterly ruined by their transplantation into the families of rich and luxurious employers,"—said Combe.

The "wet-nurse" is now almost a thing of the past, and her modern substitute is the "feeding-bottle." But as much care is required with the one as with the other. Perfect cleanliness is requisite; scalding with hot water containing some soda should be practised after each use of the bottle—the bottle, the tubes, and the mouth-piece. The milk is usually furnished by the cow; and it is not a matter of indifference how that cow is fed. If given brewers' grains, lush grass and other food which tends to a large output of milk, the milk of cows so fed is apt to disagree with the infant. Consequently in most dairy-yards a cow is specially fed for the production of milk for babies. Sometimes the milk of one cow disagrees with a baby for no apparent, or ostensible reason, and then it is well to change the milk—as it is impossible to change the baby!

In other cases tinned milk is desirable, Swiss milk has attained a special reputation for the infant's feeding-bottle. It is said to be

peculiarly wholesome from the herbage which forms the dietary of Swiss cows. Tinned milk usually contains some added sugar, and consequently only requires a certain dilution with water (about one third) to simulate human milk very closely.

This leads us to a subject which has been threshed out again and again. The curd of human milk is lighter and softer than that of cows' milk. The milk of various animals is used as a substitute for human milk. (According to Dr. Thomas Dolan, considerable differences, sufficient to give the subject a practical value, occur in the milk of different women). On this matter Dr. Pavy says—"The milk of the cow, according to above analysis, (Payen's) the most closely approximates to that of women, but it is rather more highly charged with each kind of solid constituent. Next follows the milk of the goat, which, taken altogether, is again rather richer. That of the sheep is characterized by its marked richness in nitrogenous matter, and butter. The milk of the ass and mare present striking differences from the rest. The peculiarity consists of the small amounts of nitrogenous matter and butter, and the large amount of lactine or sugar."

There are variations in the composition of the milk in different females of the same species of animal, just as there are in different women; hence the variations in the analyses and estimates made by different authorities. The milk of the Alderney cow is the richest of all cow's milk; and l'Heretier found the milk of a *brunette* richer that that of a *blonde*,—a conclusion borne out by the further observations of Dr. Dolan of Halifax,—while Dr. Hill Hassall found that the morning milk of a cow is not so rich in cream and casein as is that given in the evening. Looking at the analyses of milk, it would seem that a small addition of water to cow's milk, brings it down to human milk; while some contend for a small addition of sugar. Nor need necessarily the sugar be cane sugar; a little maltose sugar is easily procurable, as in Mellin's Food, for instance. The advantage of maltose sugar, in whatever form, to the milk is that maltose sugar rather undergoes lactic acid fermentation, while cane sugar undergoes acetous fermentation—and acetic acid is far more irritant than lactic acid, whether free or in combination with a base.

For some months milk is all a child requires; and, if it can get a sufficiency of milk, nothing else is desirable. But amongst the poor the amount of milk is apt to fall short of the infant's needs—and then some substitute must be found. Up to a recent time the

crust and sole of the wheaten loaf were boiled for some time, and the resultant product—"pobbs," mixed with some milk. Such compound was not objectionable; but when a little sugar only was added to the "pobbs," then partial starvation was the result, as I have stated before. The addition of a little butter was an improvement; but even that did not provide the salts (phosphates and chlorides) which are so desirable. Specially prepared biscuits were of much the same food-character; till at last the subject attracted the attention of the chemist who started to prepare special "Infant's Foods;" of which generally it may be stated that they lack fat. This last can scarcely be said of "lactated" foods, that is, foods containing a proportion of milk. Of the importance of fat to babies no one can entertain a doubt, after witnessing the effects of oil inunctions upon an ill-nourished child. It may be said of almost all the prepared Infants' Foods, they are intended as additions to milk —not as substitutes for it. Until the teeth are cut, and in the act of making their way through the gum, arouse the salivary glands into activity, the infant has no means of dealing with starch, before it reaches the pancreatic secretion; and raw unchanged starch is not acceptable to the infant stomach. Numerous disorders of the alimentary canal can fairly be laid to the charge of unchanged starch.

The length of time a child is kept to the breast is usually nine months. There may be reasons for weaning the infant earlier; there may be reasons (in the maternal mind) for continuing to suckle it. But considerably before this time is reached a certain amount of food other than the mother's milk is usually given to it. Panada, or in nursery language "pobbs," is well enough in its way, but its preparation is somewhat troublesome. The different prepared foods have been discussed before and need not occupy us long here. They consist of admixtures of baked flour and malted pr parations as a rule; some containing dried milk (adding fat) some a certain proportion of ground legumes (giving nitrogen). Why one should be preferred, and the circumstances under which one food would seem more suitable than another, must, in the present state of our knowledge, be left for the private judgment of the practitioner in each case. Too long continuance with any one food causes it to pall on the palate. A variety of food is as acceptable to the infant as to an adult—that is of "artificial" food. He will find the whole matter thoroughly entertained in the work of my colleague Dr. Eustace Smith, on "The Diseases of Children."

There is one drawback to these prepared foods requiring no

mastication, and but little digestion, which may as well be considered here as at any other point—though not coming into operation till a later period. It is a digression, but one of such practical importance that it may be as well entertained now instead of being postponed. It is the relation of cooked and prepared foods to the development of the teeth, and the prevalence of dental caries. The jaw is imperfectly developed and the teeth are crowded. A small mouth and a light, pointed chin are now our ideals of beauty. "Muckle-mouthed Meg Murray" the ancestress of Sir Walter Scott, would find her chances less now even than they were when Scott of Harden almost preferred death to marrying her. There is, too, an imperfect development of the teeth; to all appearance they are quite right, but their dentine is of inferior quality, and when caries sets in, this inferior dentine is readily eaten up by the tiny organisms which are at work in dental caries. A bigger jaw and teeth of superior structural quality would be an advantage. The causes in operation in this imperfect development of the masticatory apparatus is now attributed to a combination of two casual factors.

1. The fact that all food is now so prepared that there is little need of that labour of the jaws which was involved in eating a piece of hard crust, whether bread or cheese. There is, in fact, comparative disuse of the masticatory organs and that is leading, by an inevitable law to degradation of the organs; the jaw is ill-developed, and the teeth of inferior quality.

2. The further fact is the higher education of the young. A child is taken early and trained as highly as its powers will permit. The brain and the dental apparatus alike are fed by branches of the common carotid artery; to encourage the flow in one branch is to deplete another; when the blood-current is flowing freely to the brain its flow is diverted from other branches. Disuse of the jaws starves the areas supplied by the maxillary arteries; and then when the demand of education comes these arteries seem specially to feel this depletion by derivation to the encephalic vessels. The brain is fed at the expense of the maxillary area, in fact.

The lack of masticatory efforts is the starting point of this morbid departure. This is a matter not to be overlooked in the feeding of children, and a hard crust (which is highly digestible) is a good thing for a child—when it has got the teeth with which to chew or gnaw it.

When a child is weaned it has panada and milk (or ought to have this last) in liberal quantities. Now it gets milk, when this is feasi-

ble, with more or less of the myriads of prepared foods on the market; and if it is in danger of being underfed in poor households it runs an equal risk of being overfed in the nurseries of the affluent. For a considerable time the infant is so fed, until it is old enough to wield a spoon on its own account and share the porridge—oatmeal or hominy—of its older brothers and sisters. Oatmeal porridge is the staple breakfast food of the North of England and Scotland. In the more Southern areas, bread boiled in milk takes its place. The dietary of the American Continent is rich to a degree in farinaceous preparations suitable for the nursery breakfast-table.

Then for dinner comes the milk-pudding, preceded by meat-broth, thickened with some farinaceous matters, which should have made the acquaintance of the fire before being added to the meat-infusion; or perhaps by some potatoe finely broken up with some gravy or meat-juice. Too much of this latter is apt to produce flatulence, colic, and diarrhœa. Furthermore, when there exists any looseness of the bowels, this will scarcely be controlled by medicinal measures, so long as meat-infusions form a part of the dietary. Neglect of this fact, too little known, has had its effect upon infant mortality. On the contrary, when the child is constipated, it may be well to give some meat-infusion; as well as the fig, prune, or manna, commonly given.

Too much food brings about mal-assimilation, just as much as deficiency of food. "Among the wealthier classes, imperfect nutrition most generally arises from excess in quantity, or a too stimulating quality of food: but among the lower classes from deficiency in quantity or quality, added to scantiness of clothing, want of cleanliness and imperfect ventilation." (Combe.)

In his treatise on "Scrofula and Consumption"—the late Sir James Clark pointed out forcibly, how imperfect nutrition from mismanagement of diet in early days, lay at the root, or very near it, of that imperfect tissue-nutrition which, as we shall see later on, is the essential condition of these morbid states.

The milk-pudding in the nursery used to precede meat in any form; and this matter becomes of more importance as the child begins to eat meat. The starchy matters of the food, which undergo salivary digestion in the mouth, the gullet and the stomach (before it becomes acid), ought, on scientific and physiological grounds, to precede those matters which are digested in the stomach. The nursery rule would be a good one for invalids and dyspeptics of larger growth. Such milk-puddings are made with corn-flour,

hominy, semolina, vermicelli, shredded maize, samp, sago, tapioca, rice and bread and butter, as their ordinary constituents. For delicate children these different farinaceous materials need some predigestion by heat. But for healthy children it perhaps is enough to educate them to take their food slowly, so as to bring the starch into sufficiently long contact with the salivary diastase to ensure its conversion into soluble matter. In avoiding Scylla let us not run upon Charybdis.

The dietary of the nursery is ample in quantity if restricted in materials, and this is good. The appetite of healthy young creatures rarely needs stimulation, or temptation by variety beyond what has been pointed out above. Plain, wholesome food is good for children. "The same kind of food ought to be continued till after the appearance of the canine, or dog-teeth. When these have fairly protruded, a portion of soft-boiled egg may be given as an introduction to the use of a more completely animal diet. In general, solid animal food ought not to be allowed in any quantity till all the teeth have appeared and the digestive powers be fully adequate to assimilation." (Combe.) This authority holds the opinion that too much animal food leads to (1) imperfect tissue-nutrition, and delicacy of constitution on the one hand; and (2) to mental irritability and peevishness of disposition on the other; and that this combination impairs the resisting power of the organism. Consequently, such improperly fed children present lessened resistance, both in catching and succumbing to the ordinary maladies of children, as the exanthemata, whooping-cough, etc. The stronger the food, the stronger the child, is erroneous reasoning; and strong meat is not good for babes. Milk and farinaceous foods are the foods of the nursery, *par excellence.*

As to wines and alcoholic drinks, they have no business in the nursery under any circumstances. When a child is so ill as to require such stimulants, it is well to take it out of the nursery to a room of its own for the time. To give an ill-nourished child wine, is an act of weakness—in intelligence or morals. If given to please a foolish mother, it is a sin—a crime. If because the medical man does not know better, then it is high time that he be referred back to his studies—there is some lee-way to be pulled up in his case.

Of far more importance is it to insist upon a sufficiency of exercise. The invention of the perambulator has not been an unalloyed good for our little folks; it may be a ready means of getting fresh air, but riding in a perambulator is not "exercise." The waxing limbs

want unrestricted movement for their development. And exercise short of fatigue should be taken every day.

Fat is essential to healthy tissue; and how is fat to be introduced into the juvenile organism?

This is a very important matter at the present day, and one of growing importance. I was once illiberal enough to hold that the present distaste for fat in the nursery was nothing more than want of firmness on the part of nurse, and mother; but that position has had to be abandoned. There is a waxing inability to eat fat. Fat, in a visible, tangible form, is simply repulsive to many children, and as such is loathed. It must be "smuggled" into them, as old matrons put it. The hunch of bread with a stout layer of butter over the upper surface—nursery bread and butter—for many children is utterly unsuitable. The bread and butter should be cut thin, and the butter spread lightly over the surface ("company" bread and butter), and then this should be doubled upon itself; such is the rational bread and butter for the nursery with delicate children. Then a good piece of butter should be added to each "help" of milk-pudding, and so mixed therewith as to be lost to the eye. Bacon-fat is especially in demand in the nursery. The liquid fat is most digestible, and easily tolerated by the juvenile stomach. Bread crumbs may be mixed with it, or some floury potatoe. The latter with some bacon-fat and a light-boiled egg poured over it is a very pleasant form of food. Then the more solid fat of the bacon is also readily taken by most children; and a bit of "papa's baton" at breakfast is a welcome treat to most youngsters. Hominy fried with fat pork is a form of food in favour in the United States. The suet pudding with the suet finely minced is an excellent method of introducing fat into youthful stomachs. If a little treacle be mixed therewith, the pudding is all the better—both as to the palate, and as to its own food-value. Such puddings should be eaten with sugar and cream (or good milk) and with sauce. Cold rice pudding is best eaten with butter and sugar.*

However it is practically managed, a sufficiency of fat should be supplied in order to build up thoroughly healthy tissues. Butter should never be spared. The father or mother (who can afford it) who does not allow their children a sufficiency of butter, deserves to

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* Where cost is a matter of moment, a very economical nursery dish is prepared by cracking the bones of roast sirloin, say, and stewing them with rice. This dish is rich in marrow-fat.

pay the surgeon's bills of a later day for operations on joints, and scrofulous glands; to say nothing of bills for the treatment of marasmus, tabes mesenterica, hydrocephalus and phthisis; together with the bills for board and lodging at seaside health resorts. There is such a thing as "penny wise and pound foolish;" and this is a case in point. They may not grudge the cost, but recoil from the unpleasantness of insistence with their children—but, depend upon it, this is infinitely less trying than that which they will endure when disease has fastened upon their hapless offspring—when regret is unavailing. Unfortunately, too, it must be admitted that it is just the children who reject fat who most require it. There is something more than mere fad or fancy, in the child's rejection of a piece of sweet fat on its plate, and its ready acceptance of a spoonful of fishy oil. It is impossible, indeed, to insist too earnestly upon the supreme importance of an abundance of fat in the food of the nursery. It is all very well to talk of jams and preserves. They cannot take the place of butter. They are palatable adjuncts to butter; but they never can be substituted for it! If a child can be induced to eat bread and butter by spreading some jam over it—good and well. Jam, plus bread and butter, is a very different matter from bread and jam.

When a child is old enough to handle a knife and fork, *i.e.*, between four and five ordinarily, it is allowed small quantities of meat. But milk and puddings and sweets are preferred till much later years by healthy children. When children get too much meat, under the mistaken idea that this will make them strong—that the meat of the ox will make the child as strong as an ox—as great a mistake as that of calf-lymph in vaccination being followed by the growth of horns—the end aimed at is usually defeated. The child does not grow strong. It is indeed, ill-nourished and liable to all kinds of trouble, from colic to boils and eczema. In Yorkshire, where the father likes to see his little son eat "a bit of meat," it is quite common to find gouty skin affections, with the urine depositing a sediment, in children; a condition at once relieved by a suitable dietary. Children who, from a mistaken view, are given too much meat and encouraged to eat it, and who do not thrive thereon, are sometimes recommended so much wine. It is needless to say that the remedy does not lie in this direction, but in one diametrically opposite.

Probably children are allowed too little fruit. A liberal amount of sound fruit is not only good in itself but it is a pretty certain

protection, or insurance against the children gorging themselves on fruit—no matter what its quality—at the first opportunity. As said before, "one of the most pernicious habits in which children can be indulged, is that of almost incessant eating. Many mothers encourage it from the facility with which, for a time the offer of 'something nice' procures peace. Even from infancy, the child ought to be gradually accustomed to eat only when hungry, and when food is really required. After two years of age, an interval of four hours between meals will rarely be more than enough; and to give biscuits, fruit or bread, in the meantime, is just subtracting from the digestive power of the stomach. Like almost every other organ of the body, the stomach requires a period of repose after the labour of digestion, and accordingly, in the healthy state, the sensation of appetite never returns till it has for some time been empty. To give food sooner, therefore, is analogous to making a weary traveller walk on without a halt." (Combe.) To egg on, or tempt the palate to abuse the stomach by offering slices of seed-cake, buns, and sweets of all sorts, betwixt meals, is a cruel kindness. Old-fashioned people, who used plain words, used to talk of a "surfeit" when too much had been eaten. We are too polite nowadays, to use such a blunt word; but the thing for which it stands remains unchanged. A sudden rise of temperature, often accompanied by vomiting and purging, is common with children after some undue "indulgence," the euphemistic modern substitute for "surfeit." It is nothing more than a natural expurgatory process, accompanied by a bonfire, (the pyrexia), to get rid of the surplus matter.

"Children should have four meals a day; but meat only at one, or at most, two; the latter when only a small portion at once is allowed. When in health, they should have no wine or beer, except as a festive treat; no coffee, strong tea, or other exciting drink." (Chambers.)

One rule may be trusted:—a healthy child requires no temptation through its palate. It is quite ready for its meals when the time comes. Nor, as a rule, do children need any encouragement to persist in eating. They will generally eat till they feel full. Trust a child for that! Its pleasures as yet are few, and eating is the pleasure, *par excellence,* of childhood.

As regards the dietary of schools, it is now fairly liberal; indeed in some schools the diet-table is made attractive in inverse proportion to the intellectual dietary provided. Some mothers insist upon a liberal table as a *sine qua non.* Where children play a great deal,

food in liberal quantities is required. But as to the vexed question of plenty of work and little food, and little work and much food—in other words, betwixt the well-fed dunces of rich parentage and the half-starved, bright child of poor parentage, I am not called upon to decide. Work, play, and food in nice proportion, will be found to give satisfactory results.

M. Metz, of Mattray, the philanthropist, found good food, and even wine, necessary with weak-willed boys, to enable them to form a resolution and stick to it. While of old, bread and water was the dietary of refractory children until they could obey discipline; and was effective.

Cæteris paribus. I would always back a good breakfaster—from a boy to a game-cockerel. A good meal to begin the day is a good foundation!

When children are ill, they require to be fed accordingly. A child will often abstain from fluids to an extent that would be very painful to an adult, without apparent inconvenience: but when ill, it requires more fluid. A child is rarely indisposed without more or less pyrexia, and then more fluid is necessary. Sometimes fluids are purposely withheld, on the impression that they would dilute unduly the gastric juice: this is a gratuitous cruelty. No child will drink cold spring water—unless when overheated by effort. In illness, its thirst is the measure of its needs. Home-made lemonade is usually enough of meat and drink for a child in a febrile state, with the addition of a little milk and lime-water or seltzer water, or the equivalent of the latter. When tinned milk is used, whether to a sick child or one in health, it is well to remember the rule laid down before about tinned foods, viz.—that they should be used up as quickly as possible after being opened. Tinned things readily become unfit for food after the tin is once opened.

When a child is convalescent, usually its appetite is keen, and it takes food eagerly, and even greedily. All sorts of milk puddings, rice-milk, plain broths with baked flour or broken biscuit, and stewed fruit with cream, are good and proper. At this time a child is very liable to take more than it can properly digest, and acute indigestion often delays convalescence. Its guardians are glad to see it eat, and it relishes its food. But to quote a plain nursery axiom sometimes, "Its eyes are bigger than its belly;" which, being translated, means, that it takes more than it can deal with. Then a "surfeit" follows. Some children are gross feeders; some are dainty feeders. These latter need tempting by various viands, served up with scrupu-

lous cleanliness. Little neat sandwiches made with potted meat, or a thin slice from the thickest part of a tongue, or of boiled ham, and nicely arranged on a plate, will often tempt a fastidious palate and a halting appetite. One golden rule there is in feeding an invalid or sick person, child or adult, and that is—never give them too much on their plate at once; this at once impairs the zest. Rather it should be on the short side, so that the inclination is for more. Further, little appetising dishes are often devisable. "Often a child will eat a small bird, as a lark or a snipe, when he turns with disgust from beef and mutton." (Eustace Smith.) Indeed, with delicate children, their tastes must be consulted, just as in an adult. "Grown-up people are permitted to give their likes and dislikes free play, and judicious wives and cooks study the tastes of their lord and master, and see that he is duly furnished with his favorite dishes; but the poor victims of nursery abstract principles, are often forced to consume things which they abhor." (Farquharson, "School Hygiene.")

On the other hand, there is "bulimia;" which is not merely the gluttony of John Reed in "Jane Eyre." "John Reed was a schoolboy of fourteen years old, large, and stout for his age, with a dingy and unwholesome skin; thick lineaments in a spacious visage, heavy limbs and large extremities. He gorged himself habitually at table, which made him bilious, and gave him a dim and bleared eye and flabby cheeks." Such is Charlotte Bronte's typical sketch of a juvenile glutton. Such a boy was stuffed at home in a most foolish fashion: but no doubt, boxes and hampers containing rich cakes and other toothsome comestibles were regularly sent to him at school, till a most unwholesome product—physically as well as psychically—was the result. There is "bulimia" not infrequently met with, after some of the maladies of childhood, and in my own experience certainly, after measles. There would seem to be some low inflammatory condition of the mucous lining of the alimentary canal, some sub-muco-enteritis set up, which intensifies the normal sense of hunger. The child begs piteously for food during the intervals betwixt meals, its request is complied with, with the result that no portion of the food (or very little) is digested; the child remains practically unfed; its sensation of hunger is not only not relieved, but it waxes stronger. In such cases, moderate amounts of food at proper intervals are essential to recovery; while the bulimia may be relieved by some sedative—for an excess of sensation is really pain.

In inherited syphilis, the babe is not only cachectic, but its mother cannot feed it properly, as her own milk is thin and watery, and comparatively innutritive. Here Eustace Smith, and others, have found malted foods, after the manner of Mellin's, very satisfactory.

Then there are chronic conditions of tissue-degeneration, as scrofula and rickets, one of glands and the other of bones, not rarely found together, which require their own appropriate food. In scrofula, starchy foods, even if rendered soluble, are insufficient; especially wheaten flour, which has been deprived of the bran,—rich in phosphates. Here "meat, fresh eggs and vegetables" are desiraable. (Eustace Smith.) We have seen before, what Liebig had to say about the large quantities of salts, especially phosphate of soda, which exist in vegetables. Much the same may be said of rickets; where phosphorus for stouter bones is urgently demanded; and where the system is unequal to breaking up the phosphate of lime. If a laxative is indicated, then phosphate of soda may be given, which is not only a laxative, acting, too, upon the liver, but also a true tissue-food. Indeed, if phosphate of soda took the place of castor oil in the nursery, it would be well for infant economies.

In the feeding of infants, a great matter is to hit the happy medium betwixt too much and too little. The results of over-feeding," as of "under-feeding" are much the same; there is imperfect nutrition in each case.

CHAPTER XII.

IN YOUTH AND ADOLESCENCE.

For our prseent purpose infancy may be taken to cease at the commencement of the second dentition; usually about the eighth year.

When the milk teeth are being shed, and the permanent teeth are taking their place, a like change goes on in the palate, and succulent and sapid meats are more craved after. Not only that, but there is more extensive growth going on, requiring a plenteous supply of tissue-building material. The change of taste comes on gradually, and it is not till after puberty that the full craving for the flesh of animals is ordinarily developed. King Chambers, while stoutly maintaining the need for plain wholesome food, says "Extreme monotony should be avoided." He also condemns "family whims" about food. "It is astonishing," he goes on, "how ingrained some of these acquired idiosyncrasies become, and indeed after full manhood is reached they may be concealed, but are never quite overcome. Yet few of the minor thorns in the rosebud are so vexatious to oneself and others. I shall not soon forget the annoyance of taking a young man to a Greenwich dinner, and finding that he never ate anything which swam in the waters." It is clear, indeed, that he wished that that young man was cast upon a desert island, with only denizens of the sea for choice, when he penned the sentence. Even admitting that the dietary of the young should be simple, he thinks it a good plan in view of future roughing it in the world, if young persons would learn to eat what is set before them —so far as they are able!

Then comes the question of school life. In Great Britain at the present day no school has any prospect of survival which does not provide a liberal dietary. Mr. Squeers of Do-the-boys Hall would find it very difficult to make his scheme work at the present day. The institution of the Penny Post has buried the system of underfeeding at schools,—at least for boys. And it may be questioned if a schoolmistress would see any of her pupils for a second term if her cook kept a tiny watering-can with a rose by which she soaked

the toast with water to economize butter. An old North Country yeoman used to tease me when a schoolboy by telling me—"There are only two creatures that will pay for starving—school children and wintering sheep." (In both cases the pay was forthcoming if the creatures were handed over alive—no matter in what condition.) All that is changed now.

Dr. Farquharson strongly condemns the habit of eating confectionery and sweets betwixt meals, which he terms "gastronomic nipping;" in allusion to alcoholic "nipping" or drinking betwixt meals. He also protests against the system of hampers from home. King Chambers delivers himself thus—"The gorging themselves with pastry and sweet stuff at the confectioner's, as practised habitually by schoolboys and often by girls when they get the chance, lays the foundation not only for indigestion in after years, which is its least evil, but also for a habit of indulgence which is a curse through life." It is indeed a survival of the practice of supplementing the scanty rations in the old semi-starvation days, when some such extra food was really required. But at the present day, it has no valid foundation; some cheap sugar or sweets for the ill-fed children of squalid neighborhoods is another matter.

Dr. Farquharson, who was medical officer to Rugby school, has had both the opportunity and the inclination to study the school regimen. He says authoritatively—"Little children, probably, do not require meat once a day, but growing lads working hard both with brain and muscles, require a liberal allowance of nitrogenous food, and will hardly be satisfied with the old-fashioned breakfast of tea and bread and butter. To these must be added something of a more nourishing character, and actual flesh may be frequently varied by fish, bacon, or eggs, which need not be in large quantity, but good of its kind and well prepared." (Like King Chambers he is dead against a stiff lesson before breakfast.) As to dinner, he observes, "It is not of course an easy matter to provide much variety under the ordinary circumstances of school life; but the perpetual roast joint may sometimes be boiled, or baked, or stewed, meat pies and Irish stews and various hashes may be given from time to time; and the opportunity should not be neglected of proving how good a thing cold meat really is, in spite of the social obloquy to which it has been for so long subjected." At this point it may be said that the great objection to stews and hashes lies in the suspicions of the children and their parents, that they are made of inferior meat. As to cold meat, in hot weather cold meat with potatoes (old ones

mashed and new ones boiled) and other vegetable products, as carrots, for instance, or greens, forms an excellent midday meal. The Doctor goes on, "We have already spoken of the great dietetic advantages of vegetable soups and stewed fruit, and of green vegetables which keep up the balance, so important to be maintained, between nitrogenous and non-nitrogenous food." He holds that a form of incipient scurvy is apt to develop in schools where the vegetable element is defective in the dietary. "The major forms of this terrible disease are rarely met with nowadays, but miniature types occur much more frequently than is generally supposed; and when boys grow pale and flabby, when they readily bruise when struck, and when their gums are spongy even to the smallest degree, then our suspicions should be aroused, and we must direct the treatment accordingly, and this will not be by drugs alone, but by ordering the consumption of such things as will supply the vegetable acids which keep up a healthy quality of the blood." (School Hygiene.)

When boys are but day scholars and only dine at school, they share the family fare; and the watchful maternal eye sees that they get both sufficiency and variety.

Tea is a light meal, whatever its composition, and is followed by bread and milk, or perhaps bread and cheese and some light beer as supper.

"Then something may be said of athletic training. Absurd old whims of the prize-ring still linger as traditions. Meat all but innocent of the fire is preferred to cooked meat, contrary to all physiological teaching. Green vegetables are forbidden." Pies, puddings and sweets are eschewed rigorously; despite the fact that Hindoo wrestlers train on sweets, as Sir Joseph Fayrer, M.D., K.C.S.I. informs me,—"while strong ale or port take the place of other beverages." "A schoolboy who gets plenty of sleep in good air, is well-fed and not overworked, and plays at games vigorously all the year round, may be said to be in a perpetual state of training, and hardly requires to adopt any particular system; but he is sure to have picked up from books or ignorant people some fantastic notions about diet, and these should be dispelled as quickly as posisble." (Farquharson.) He admits, "It may be necessary to enforce a strict diet regimen on professional athletes who tend to lead irregular lives." In the diet-tables of boating men which King Chambers copies from Maclaren's "Training in Theory and in Practice" there is nothing remarkable, let alone mysterious:

CAMBRIDGE SYSTEM.

SUMMER RACES.

A Day's Training.

Rise at 7 A.M. Exercise.	Run 100 or 200 yards as fast as possible.	The old system of running a mile or so before breakfast is fast going out, except in the case of men who want to get a good deal of flesh off.
Breakfast at 8.30.	Meat, beef or mutton. Toast, dry. Tea, two cups; or towards the end of training, a cup and a half only. Watercresses occasionally.	Underdone.
Exercise (forenoon).	None.	
Dinner about 2 P.M.	Meat, beef or mutton. Bread. Vegetables—potatoes, greens. Beer, one pint. Dessert—oranges or biscuits or figs. Wine—two glasses.	Some colleges have baked apples, or jellies, or rice puddings.
Exercise.	About 5.30 start for the river ,and row to the starting post and back.	
Supper about 8 or 9.	Meat, cold. Bread. Vegetables—lettuce or watercresses. Beer, one pint.	
Bed at 10.		

This means meat three times daily, two glasses of wine (quality unknown, probably sherry or port) and two pints of ale—probably not a thin or poor ale.

WINTER RACES.

A Day's Training.—The only difference is a luncheon of cold meat at one P.M., "with half a pint of beer, or biscuit with a glass of sherry, perhaps a yolk of an egg in the sherry"—instead of supper; and the rowing exercise at two P.M., instead of half-past five.

The dietary is that of a well-fed prudent navvy, who diets himself so as to earn the best wages he can,—while the exercise falls far short of his work; there being this difference, the navvy works hard and steadily for many hours, while a racing crew have to make a supreme effort for a limited time, certainly under one hour. A highly nitrogenised dietary, as we have seen before about horses, is essential to the rapid liberation of force—the carnivorous panther can pounce upon the deer, which would soon leave the panther hopelessly behind in a fair race.

Pursuing the subject (with healthy young persons under consideration at present), something may be said of the regimen of girls. The regimen of girls is plainer than that of boys. Byron's "bread-and-butter misses" remain much the same. Elegance involved fragility; and for a boarding-school girl to look robust and apple-cheeked was to call forth the derision of her schoolmates, with the crude satire of the young and allusions to "dairymaids." After speaking of the evils of overfeeding and the mal-assimilation so induced, Combe wrote—"The opposite error of not providing a sufficiency of nourishing diet for the young is, from mistaken views, much more prevalent than it ought to be, particularly in female boarding-schools, where the system of diet is often insufficient for due sustenance and growth; and where consequently the natural expression of impaired health, if not actual disease, is a marked feature in the aspect of most of the pupils. So defective indeed is the common school management in this, and other respects, that we have the best authority for considering it as a rare exception for a girl to return home in full health after spending two or three years at an English boarding-school. It is true much of this result is owing to confinement, neglect of cheerful exercise, ill-ventilated sleeping apartments, and other depressing influences; but to these that of an insufficient dietary must often be added, and when it does exist it acts with double force from the impaired digestion, which seldom fails to ensue where the laws of health are so widely outraged."

Dr. Barlow on "Physical Education" in the "Dictionary of Practical Medicine" thinks that of errors of diet a spare regimen is more deleterious on the whole than a nutritious one. "The effects of casual repletion are less prejudicial and more easily corrected than those of inanition." To an imperfect dietary is added impaired digestive power from visceral congestion and inactivity of the bowels due, partly, to lack of outdoor exercise, partly to compression of the

viscera in order to secure a graceful figure. To appearance, many sacrifices are made by girls. In order to acquire pallor and get rid of the hue of health some girls take an excess of vinegar, and attain their end by destroying their digestion. Others again in order to acquire the desired hue eat raw rice, until by setting up confirmed constipation they ruin their sanguiferous machinery. It is difficult for a schoolmistress to watch and detect the vagaries of her charges, no doubt, or discover the amount of slate pencil, chalk, etc., devoured in secrecy; and with this aspect of the subject we are not at present concerned. Then the dietary of school girls is less highly nitrogenised than is that of boys; and this is desirable so long as the physical exercise is so limited as it at present is.

Breakfast usually consists of bread and milk boiled, or porridge followed by toast dry, or buttered, with rashers of bacon or meat in some form. Then at midday dinner there is meat with vegetables and milk puddings of all kinds and varieties—excellent food, as Dr. Beaumont found with Alexis St. Martin,—with stewed fruit. A sufficiency of this latter is desirable where there lurks a tendency to constipation. Tea is a light meal, and supper consists of bread and milk. The dietary is apt to be deficient in fat, and butter should be freely used. Cod liver oil is often requisite where the assimilation of fat is defective, or the palate abhors it. So much for schoolgirls.

The broad rules of the dietary for an active outdoor existence indeed are followed in a vague way. With more physical exercise would come a taste as well as a demand for more meat in the dietary. So long, however, as the exercise taken is restricted, so long it is well to have a dietary arranged accordingly therewith.

And in connection with this subject of feeding young people, two matters may be considered of much importance in early life.

Of all the food taken into the animal body, carbo-hydrates, albuminoids and fats, each and all can be found in the vegetable world. Only metabolism and oxidation—the one for tissue-building, the other for the production of heat and force—go on in the animal world. The plant builds up, giving off oxygen; the animal oxidises. The plant has no temperature, it is alleged (but where molecular activity is going on there must be production of heat),* while animals vary; the lower possessing some heat while the higher animals

* To say nothing of tropical plants dying of cold when transplanted, and so of Arctic flora in warm countries.

have a distinct body temperature of some 100° Fahr., derived from combustion within the organism. The plant is motionless; the warm-blooded animal is active. These two matters—body heat and motility, belong to the animal world. Consequently the animal possesses for these ends a circulation and a nervous system.

Carbon and hydrogen unite with oxygen, but the blood must contain an oxygen carrier for this combustion. The red blood-corpuscles bear the carbonic acid to the lungs giving it off there; and take in oxygen. The venous blood laden with carbonic acid is dark in hue. The arterial blood charged with oxygen is bright in hue. What is it which carries on this chemical interchange? It is the hæmoglobin of the red blood corpuscle. Hæmoglobin is a very complex substance with a formula something like this—$C_{54}H_7N_{16}O_2So_{39}Fo_{43}$ with 3 or 4 per cent. of water of crystallization. This complex body has to be built up within the animal economy, being essentially an animal substance. The plant has no requirement for a blood-corpuscle. Its circulating fluid corresponds to the liquor sanguinis. Consequently hæmoglobin cannot be taken from without. Nor can it be introduced into the system by drinking blood. It consists of a union of hæmatin ($C_{32}H_{34}N_4F_2O_5$) with a proteid, and that proteid must be converted into a peptone ere it can pass into the blood.

Anæmia is a dearth of red blood-corpuscles, which is not curable merely by furnishing iron to the system; though of course, iron is part of the cure. At puberty, especially in girls, there is a distinct tendency to anæmia. Sometimes there is even chlorosis or green sickness, with a positive breaking down of the blood-corpuscles, and discoloration of the skin from hæmoglobin; just as a bruise changes its hue to green, as the effused blood is absorbed. For the cure of anæmia—and also for its prevention—good food, containing a fair amount of meat, and fresh air, is as essential as iron itself.

So much then, for one malady linked with the later years of growth, which requires its dietetic as much as its medicinal management.

Animals possess a nervous system; also a matter not required by the vegetable world. This nervous system has its own wants, and its food seems a phosphorized fat, known as "Lecithin," with a formula $C_{44}H_{90}NPO_9$. It, too, is a complex body, built up within the organism. When the brain is overworked for a long period, its functional activity is impaired, as seen in "overstudy." As a matter of fact, however, the young man who has "overstudied" is usually

a person with a naturally feeble brain, which has been found unequal to surmounting the usual educational tests. Recently, when compulsory education has caught in its net all our waifs and strays, or social Arabs, it has been found, as a matter of fact, that "overstudy," leading to brain collapse, is quite common. When the poor little things can get enough to eat and feed their brains, then these last are quite equal to what is demanded of them. When the dietary of girls' schools was notoriously insufficient, a break-down was far from an infrequent event. Rest from work, change, and a more liberal table, brought matters right in time.

We may suppose a failure in the supply of lecithin as the material factor of this brain exhaustion. As phosphorus is a constituent of lecithin, this element should be supplied in any form which can furnish it.* Our assimilative processes seem ordinarily to possess the power to break up phosphate of lime, or phosphate of soda, and so provide the free phosphorus required for the nutrition of the nervous system. But under the unfavorable circumstances of under-nutrition, the power seems to be more or less completely lost, and then it becomes necessary to furnish phosphorus in forms less stable and more easily broken up. The hypophosphites are available for this end; and may advantageously be added to the dietary when the demand upon the brain is great and the assimilative powers are feeble, or food is supplied to them in insufficient quantity.

Iron then, for anæmia, phosphorus for brain exhaustion:—but both with a sufficiency of food.

Indeed, in youth and growth, the maladies are mostly (except the contagious diseases and the results of exposure to cold) the outcome of insufficient nutrition. As was pointed out before, the consequences of over-feeding are much the same as those of underfeeding; because, in each case it is a question of defective assimilation. To swallow food—and to digest it, are not one and the same. It is what is digested,—not merely what is eaten—which has to do with nutrition.

The appetite of youth needs not the stimulus of food tempting to the palate. Plain foods are quite enough in most cases. With invalids some temptation may be desirable, or even requisite. But of that anon. A sufficiency of plain food, meat puddings, etc., should be provided; and when this is done, eating betwixt meals at

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* "Ohne Phosphor kein Gedanke."

confectioners is not necessary, and is certainly undesirable for young people of either sex.

Until growth is completed, alcoholic drinks should be avoided; and only given when there is a very clear indication for their use—and this is not likely to occur in a condition of health.

CHAPTER XIII.

FOOD IN ADULT LIFE.

When the period of growth is completed, the dietary chosen varies with the individual, the occupation followed, the opportunity for acquiring food, and of course according to the appetite and palate.

Some broad rules, however, may be laid down. In the first place persons of square abdomen and large viscera prefer a good substantial meal at not too frequent intervals, while persons of thin flank usually find small quantities at once, and frequently repeated, suit them best. It is just the difference seen in steam-engines, or rather locomotives. The express engine, running long distances without stopping, has a large capacious tender to hold the requisite quantity of fuel. Locomotives which run short distances, as yard-engines for instance, have small tenders; which, however, will accommodate what fuel is required in their case. If the engine with the small tender were to attempt to do a long distance its fuel would run out; in fact its tender would not hold enough fuel to enable it to do the distance. So it is with human beings. A wife of slight physique (with a small tender) tries to accommodate her meal-times to the ways of her substantially built lord, and fails signally. She must have one at least, or more meals betwixt his solid breakfast and his late dinner; she could not hold enough to carry her over the long interval, if she tried her best. She makes the attempt to do as he does, and utterly fails. She is not built on the same fundamental plan, and cannot do as he does.

Men differ too; the man of small viscera requires his meals at comparatively short intervals, because he can take in but a small quantity at once. Some savages who have to eat as they can procure food, eat enormous quantities at once, when they get the chance, and then fast accordingly. They break their fast when they get the opportunity. Our word for the morning meal is "break fast" because it breaks the fast of the night. This matter of eating, and the large and small tender, is far too little considered, where a number of persons are living together. If it received due attention

much discomfort, if nothing more, would be avoided. "Many females and delicate persons injure their powers of digestion by delaying their exercise till the system is too much exhausted to profit by it." (Coombe.) When I was in country practice, I noticed that certain farmers' wives were always ill after attending market. They were all of the "small tender" type. They breakfasted early, bustled about at market, took no midday meal (as usual), and so had a racking headache before they got home, and were "past eating" to use their own language. Too long delay destroyed the appetite when the opportunity for food came. Many persons cannot eat their breakfast for this reason; the long fast betwixt supper and breakfast is too much for them; such persons need something in the middle of the night. Some milk, with or without malt in it, in a jug with a lid (so as not to acquire any taint of the room), and if the weather is cold, kept warm under a "tea-cosey," is a ready and handy form of food for such persons. Or some beef tea and baked flour may be used instead. "Chronic invalids and persons of a delicate habit of body, are also familiar with the fact of the animal heat and general vigor diminishing towards morning. During the prevalence of cholera, both here and on the continent, it was often remarked that a large proportion of the attacks occurred early in the morning, in persons who had gone to bed apparently well." (Coombe.)

There can too be no doubt that digestion is much quicker with some persons than with others. And this is a matter which does not permit of more being said. It is a matter of experience with each individual.

In old days after a hard fight on a long march, or a day's hunting, came a good feast. But in our degenerate days we cannot do this. And with persons of weak digestion, it is a good rule to eat less, and to be particular about the food being easily digestible when tired. Perhaps to eat less, and take a little extra wine, is the best plan to adopt.

Meals must vary according to the individual. The Anglo-Saxon prefers a substantial breakfast. The Frenchman and the Austrian like a cup of coffee and a roll on getting up, and then take a substantial meal about eleven A.M. They take a second good meal in the evening. It is well to have some food early, especially for those who study, or work for hours in the early morning. The glass of rum and milk first thing in the morning recommended for consumptives, often is of the greatest utility, and enables them to eat a fairly

good breakfast; which otherwise they could not do—in consequence of the long fast. Times for eating must depend on the individual requirements. Families usually get on well together, because of family likeness to each other. When a stranger comes among them then somebody is apt to suffer.

The difference in individuals as to their food requirements has been noted by James Henry Bennett, who says, "In some persons the digestive process being very rapid, frequent meals are required even when abundant. For want of food at comparatively short intervals, for instance, four or five hours, sensations of sinking and faintness come on, and if the desire for aliment is not gratified, the appetite disappears, and general prostration with headache and even nausea ensues. In others, on the contrary, the digestive process appears to be very slow. When hunger has been appeased, the desire for food is long in again making itself felt. Such persons are generally satisfied with two, or at the most three meals a day. They are often not large eaters, do not require so much animal food, and can bear much better than the former, accidental or forced abstinence." Elsewhere in discussing the same subject, he writes—"The food requirements of adult human beings vary according to climate and temperature, and according to the activity of their organs; they also vary according to individual peculiarities. Some persons, even in health, digest rapidly and imperfectly the food which they consume. With them a considerable amount of it passes away undigested through the intestinal canal, and escapes with the fæces. With persons so constituted, hunger soon returns, owing to the demands of the economy having been imperfectly supplied, and a fresh supply of food is required; it is as if half the coal placed on a fire had fallen through the grate. With others, on the contrary, the process of digestion is slow, and the elaboration of the nutritive materials contained in the food is complete. Such persons both require less food, and that food less frequently, inasmuch as they extract more nourishment from what they take." And such individual peculiarity is by no means confined to human beings. All who have had much experience of horses, know that some can do a great deal of work on moderate supplies of food, while others "eat their heads off in no time," in stable language, and yet are not capable of much work. And this seems to hold good of breeds of horses. Once I had two out of the same mare, which were just like their mother, in the small quantity of food they required, to do their work and keep in good condition.

It is also certain, that the temperament of the individual influences the taste for and the amount of food taken. Coombe offers "the following imperfect remarks" which, however, seem worthy of quotation. "Where the constitution is of a mixed nature, or a compound of two or more temperaments, a diet composed of animal and vegetable aliment in nearly equal proportions is under ordinary circumstances the best. But where any one temperament predominates, the diet ought to be modified accordingly. Where, for example, the sanguine constitution prevails, and is characterized by a florid complexion, great activity, strong action of the heart and blood-vessels, and a consequent liability to diseases of excitement and inflammation, the food ought to be habitually of a kind calculated rather to soothe than to stimulate. Red meats, spices, wines, and fermented liquors ought to be used sparingly; and the principal support to be derived from refreshing soups, fish, mucilaginous vegetables, acidulous fruits, and diluting drinks. In the case of lymphatic persons, on the other hand, where the circulation is weak and slow, and all the functions are feeble, the system is benefited by the stimulus of a larger proportion of animal food, especially red meat and game; while vegetables, soups, and fluids of all kinds prove relaxing and hurtful. Aromatics and spices, however, are useful, as is also wine in moderation, and conjoined with adequate exercise. If again, the individual presents a highly nervous temperament, characterized by delicacy, unusual sensibility to impressions, and great excitability, without proportionate strength, such as is often seen in females and in men of genius, care ought to be taken not to make use of a heating or stimulating regimen. White meat, such as fish or fowl, are more suitable than the kinds in ordinary use. Spices are also hurtful, but farinaceous and mucilaginous aliments and ripe fruits, are generally admissible,—always supposing that moderation in quantity is attended to, and that the mode of life is in other respects regular and rational. When the dark bilious temperament predominates, and much bodily exercise in the open air is enjoyed, more latitude in the choice of food is admissible, than in any other constitution." With this last opinion, however, I can not quite agree, as my experience has gone in the direction that bilious people do not do well on quantities of albuminoid food; a matter that will be discussed in a later chapter. Otherwise what Dr. Coombe says quite falls in with my experience.

The habits and food customs of the individual too must be cal-

culated, and form a matter of some importance, which those who meditate foreign travel too often neglect.*

Dr. Bennett writes, "Just as the stature, features, and bodily proportions assume a characteristic peculiarity in each individual during the period of growth, so the organic system also receives its stamp, the result of early habits which usually last throughout life. The habits of organic life, if we may so term them, are particularly marked in the digestive system. A man who has been brought up to the adult age on a very animalized dietary, in after life requires such a dietary more than one who has lived principally on vegetable food. Again, the one who has been accustomed until middle age to eat often, may not with comfort and advantage be able to supply the wants of his system by two meals only; and yet this system of feeding may perfectly agree with his neighbor early inured to it. Thus it is that the German, the Frenchman, and the Englishman become habituated to the food and food hours which obtain in their respective countries, and that their digestive powers often give way when they change their residence, and endeavor to conform to the novel habits of their new place of abode.

"These facts were well illustrated by what occurred during the Franco-German War (1869–70). Many thousand French prisoners were put on the usual dietary of the German soldiers—sausage meat, coarse bread, and beer. The common soldiers, peasants, and artisans, accustomed to a coarse and spare dietary at home, did very well, throve; but it was not so with their officers. The latter became dyspeptic and ill, and in many cases their health was broken down and ruined. I have attended at Mentone several in whom the seeds of fatal diseases, principally phthisis, were then sown."

To a slighter degree the same thing was seen with the Anglo-Americans who were studying in Vienna the winter the writer was there. Himself, a hardy North-countryman, got on well enough; but nearly every other one complained of the food being indifferent, and were more or less out of sorts from it, if not actually ill.

On the other side may be quoted a case which Coombe took from Heidler—"A young woman of healthy constitution, brought up in

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* When some of the inhabitants of St. Kilda's, a wild rock in the Atlantic far away to the west of the Hebrides, emigrated to Australia, it was found "they could only be kept in health by an occasional meal of the rank eggs and dried puffins they carried with them." While Finn recruits in Russia miss the birch-bark in their brown bread on leaving home.

all the simplicity of country habits, passed at once on her marriage to a less active mode of life, and to a much more elegant table. In a short time she began to complain of irritability, lassitude, various spasmodic sensations, and habitual constipation. Hypochondria was soon added to other symptoms; her hope of becoming a mother being always deceived. An additional glass of wine, bark, and other tonics were ordered. The evil increased. The patient became melancholic, and believed that she was always swallowing pins. In the course of the year she became so emaciated and yellow that her mother, who had not seen her for eleven months, could scarcely recognize her. After an eighteen months' course of purgatives, and two courses of Marienbad water, she entirely recovered."

The same thing is commonly seen in country girls coming into towns to sedentary occupations; and young fellows abandoning an active life to wait behind a counter—especially in rooms indifferently ventilated. "The operation of the same principle is equally conspicuous in girls sent from the country to the work-rooms of fashionable milliners and dressmakers in the larger towns." With little exercise they require less food; but if the appetite keeps up, headache, sickness, biliousness, indigestion and constipation are apt to follow. Strong and healthy fellows who come up from the country to sedentary trades and occupations also require and get some unpleasant experience before they can adapt themselves to their new form of life with its novel needs and requirements. The same is found in the case of the traveller, who from a life of privation and hard bodily labor comes to luxury and dines out, while he settles down to a sedentary life to put his book through the press. He soon finds that his new life makes new demands upon him, with which he must comply, or pay the penalty. Light food of a kind likely to keep the bowels open (see a later chapter for this), is the aliment which will keep him in health.

Then comes the relation of food to climate. In tropical countries the carbo-hydrates form the staple of food. In temperate climates a mixed dietary has been adopted as the result of experience; while in Arctic regions the concentrated fuel-food has been found the only food that will sustain life amidst the intense cold. The stomach of an Esquimaux could not hold enough of carbo-hydrates to preserve him against starvation in the low surrounding temperature. Liebig pointed out that the carbo-hydrates of the tropics contain only some 12 per cent. of carbon. The fatty food

of the Esquimaux, blubber and oil, contains from 60 to 80 per cent. of carbon; consequently we can readily understand the preference manifested for fat in Arctic regions—for heat-generating material indeed. There is no taste for sweets in these Northern climes, and Sir Anthony Carlisle found that even babies there had no taste for sugar, spluttering it out of their mouths, "while the little urchins grinned with ecstacy at the sight of a bit of whale's blubber." All Arctic voyagers have found the necessity for following the Esquimaux in the direction of eating fat in liberal quantities.

The importance of this matter of climate and food requirements is illustrated by the need for varied stores when bodies of men are sent out on expeditions. According to the temperature so must their food supplies be furnished—as to quality and quantity.

And closely linked with this matter comes that of the relation of food to work. It has been pointed out before that both with men and horses more nitrogenised food is required when active exertion and hard toil have to be endured. We see the farmer raises the allowance of oats to his horses at ploughing time. The Arab gives his horse barley and camel's milk, and if great effort be required, even camel's flesh. The horses used in Sahara to course ostriches get camel's milk and dried beans. (Pavy.) This is a very highly nitrogenised food material, but the excess of nitrogen enables the horse to make rapid movements. The muscle itself does not wear out in exertion, as was once supposed. Traube held that the muscles burn up hydro-carbons, as fats or carbo-hydrates. Possibly the store of glycogen is the fuel of the muscle when at work. "The muscles appear to stand in the position of instruments for effecting the conversion of the chemical energy evolved by the oxidation of combustible matter into working power. While admitting that hydro-carbons are the fuel which produce heat and force, the necessity for albuminoid materials for hard exertion has also to be recognized; as albuminous food produces firm muscles, so exercise makes them hard. To sum up, science intimates that a liberal supply of nitrogenised matter is necessary to produce and maintain muscles in a good condition for work, and the result of experience is to confirm it." (Pavy.)

This brings us face to face with exertion in cold climates. The Esquimaux consume much lean meat with their fat without injury. We can understand oxidation being very active in Arctic climes; and as has been said before, so long as the liver can convert

the waste or surplus albuminoids into the soluble urea, so long all is well.

If the muscle itself does not wear out, what is the reason that nitrogenised food is essential for severe exertion? It seems to me the answer must be found in the stimulant effects of kreatin and kreatinine,—the stimulant factors of beef tea. They are force-liberators, and so enable the system to get at its stored force more rapidly and readily. And a certain proportion of them is essential to active effort. Navvies, lightermen, and others who work very hard have found that a considerable quantity of meat in their dietary is essential to enable them to undergo their toil. Dr. James H. Bennett, in discussing this subject, says—"I was told by an eminent railway contractor, that when some of his navvies were first taken to work on French railroads it was found that they could do in the same time double the amount of work got through by the French workmen, who lived in a much more sparing manner, and principally on bread and vegetables. The French sub-contractors were obliged, in order even partly to efface this difference wounding to their national pride, very considerably to increase the dietary of their workmen, and more especially to nitrogenise or animalise it. By adopting this course, the French workmen very soon increased their muscular powers. The materials for greater muscular development being given, and the muscles at the same time freely exercised, the organic nutritive changes became more rapid, the muscles increased in compactness and volume, and the work power increased in proportion." This reminds one of Pavy's story of a farmer who, when asked—"how it was that he paid his laborers so well?" replied "that he could not afford to pay them less, for he found that less wages produced less work." The old Northern farmers always kept a liberal table, saying—"Work goes in at t'mouth."

Sir Lyon Playfair some years ago took up the subject "On the Food of Man in relation to his useful Work." He found that a "Subsistence diet" for persons who were not doing any work ran about as follows:—

Nitrogenous matter, ...	2.33 oz.
Fat, ...	0.84 "
Carbo-hydrates, ...	11.69 "

Dynamic value in foot tons, 2,453.

Diet of adults in full health with moderate exercise, as the soldiers of the great European armies:

Nitrogenous matter,	4.215 oz.
Fat,	1.397 "
Carbo-hydrates,	18.690 "
Mineral matters,	0.714 "

Dynamic value, 4,021 foot tons.

Diet of active laborers, including that of soldiers in war time:

Nitrogenous matter,	5.41 oz.
Fat,	2.41 "
Carbo-hydrates,	17.29 "

Dynamic value, 4,458 foot tons.

In this last it will be seen that the force-liberator—the nitrogen—is considerably increased; and that the concentrated heat, or force food (fat) is also notably increased, with a fall in less concentrated hydro-carbons.

Dr. Parkes found the food of the English soldier on home service to be:

Nitrogenous matter,	3.86 oz.
Fat,	1.30 "
Carbo-hydrates,	17.34 "
Mineral matters,	0.808 "

which is very close to Sir Lyon Playfair's estimate.

From these we can form useful broad rules as to the dietary of convicts (not doing hard labor) and persons in workhouses. While comparatively short rations will do when no labor is exacted; a more liberal dietary becomes necessary when work has to be done; and when very severe exertion is expected the dietary must be still more liberal both as to force-liberators and force-producers. The capacity of the English soldier in war has always been looked upon as closely linked with his commissariat. Prowess and food go together. Of course the question of food can never be separated from that of clothing in cold climates,—the more that is required for the heat the less is left for force-production. The native of Arctic regions is clad in furs in order to reduce his heat loss, and so lessen the demand upon his fuel-stores. Even then he needs liberal quantities of fat, (the concentrated fuel-food). About twenty pounds of meat and blubber per diem is the ordinary allowance. And Sir John Ross found that a large consumption of "Greenland food" was the road to success in frozen countries. "The quantity of food should be

increased, be that as inconvenient as it may;" and of course to economise food by suitable clothing as far as possible.

On the other hand the Englishman who will persist in the dietary and especially "the roast beef of old England" in tropical climates sooner or later falls ill with some hepatic trouble; because his liver cannot deal effectually or successfully with the albuminous food which he consumes far in excess of his body-wants. In Greenland he would hunger to death—be entirely burnt up "stock, lock, and barrel"—in two or three days on a dietary amply sufficient for the plains of Bengal, or the Guinea coast. And *vice versâ*, a Greenland dietary would pall on the appetite in tropical climates.

"There can be no doubt that a large proportion of the diseases of the digestive apparatus which are so fatal among European residents in India and other tropical climates result from the habitual ingestion of a much larger quantity of food, and this especially of a rich and stimulating character, than the system requires. The loss of appetite consequent upon the diminution of the demand for combustive material, is set down to the deleterious effect of the climate; and an attempt is made to neutralise this by artificial provocatives.'' (Carpenter.)

Taking his statement "that about two pounds of bread and three-quarters of a pound of meat are amply sufficient to compensate the daily losses of the system in a healthy man" (in a temperate area), we can see that considerably less than this is enough for the body wants in a tropical climate; and that much more will be required to maintain the body heat in the Arctic regions, especially if considerable exertion is also entailed.

Women as a rule eat very much less than men. They lead an indoor life, usually in warm apartments; they are smaller in frame, and lighter in weight, and consequently require less food. When women are out much in the air, either as ladies hunting or field hands, their needs are increased, and substantial meals are indicated, and usually are taken—by the ladies at least. But amongst uncivilized tribes, women often perform much of the hardest work, and probably take food accordingly.

The clerk, cooped up for many hours daily in a warm office (often up to 70° Fahr.), requires comparatively small quantities of food; the same may be said of the mill hand and the artisan, or handicraftsman working indoors. But for the field hand, the bargee and the lighterman, and the soldier on active service, a liberal diet-scale must be allowed if he has to keep in working condition. For

persons performing little physical toil the food should consist largely of carbo-hydrates in the form of farinaceous food, with some nitrogen such as a fish diet could supply, and a little animal food. Of course, where there is any tendency to tissue degeneration (phthisis or scrofula), a certain quantity of fat is desirable. But with all this calculated, we must still reckon with the disturbing factors, the "palate" and the "appetite," which will rule the roost with many persons.

In a vegetarian dietary, the legumes (rich in nitrogen) take the place of meat, while oil supplies fat; and mineral salts are furnished by vegetables, as cabbages. No doubt a great deal of excellent work has been done by vegetarians; and a great many people would do wisely by becoming semi-vegetarians, at least, especially in warm weather—the writer's own personal practice. But then there are to be heard so many other voices, including those of the housewife and the cook than that of Science on this topic!

Then comes the matter of the opportunity of acquiring food. This is a matter which can scarcely be discussed at length here. It is a well-known fact that stockmen and miners have very often to live on undesirable food, as "damper." Flour cakes are indigestible, and pancakes have been the ruin of many a stalwart fellow, who ate them because he could not get anything else.

The subject of the food requirements of adults may fitly terminate with some considerations of the tendency of the age. We have not got the internal arrangements of our ancestors, and cannot deal with the quantities of food they ate apparently without ill effect. And this is specially true of meat and alcohol. There is a widespread movement towards "Vegetarianism" and "Teetotalism" among the Anglo-Saxon race at least; and this must have some acting agent. In a little work published some time ago, ("The Food we Eat") the writer speculated as to the dietary of A.D. 2000. What is put there in a light and jocular manner is however what he seriously believes will be the case, and what we are coming to. But of course the spirit of the axiom, "the future must take care of itself" prevents anyone from taking any steps for their potential descendants. For the bulk of persons a lighter dietary consisting largely of cooked farina (otherwise predigested starch) and milk will probably be found the best. But for those engaged in literary work some doubt may be expressed. "The grim old rufflers of the tongue and pen" were eaters of meat and drinkers of wine; and Carpenter states:—

"And while on the other hand it may be freely conceded to the advocates of 'Vegetarianism' that a well selected vegetable diet is capable of producing (in the greater number of individuals) the highest physical development of which they are capable, it may be on the other hand affirmed with equal certainty, that the substitution of a certain proportion of animal flesh is in no way injurious, while so far as our evidence at present extends, this seems rather to favor the highest mental development."

So much then for the food wants of grown man under the various circumstances of occupation and environment.

CHAPTER XIV.

FOOD IN ADVANCED LIFE.

"A MAN loves the meat of his youth that he cannot endure in his age."

So said that most remarkable observer, Shakespeare. How he ever found time and opportunity to observe all he did, is a marvel to ordinary mortals. This observation too is perfectly accurate.

There are a good many reasons for the inability in age to cope with the dietary of youth. We saw in the last chapter the relations of the food to the individual, his work and his environment; and can apply its lessons here. As age advances the energies wane. The capacity to take exercise or undergo toil is enfeebled, and the inclination to do so also lessened. A man pleads he "is not so young as he once was." His limbs are stiffer and his wind is not so good. Some certainly retain their vigor till a very old age, and with it their digestion and their gastronomic ardor. In my days of early practice in the North of England, there was an old gentleman of the old school, and the habits and practices of the Regency. From early morn till dewy eve he sturdily walked throughout the day in order that he might enjoy his late dinner. His bell was his god; and he was an earnest faithful worshipper! It was not a lofty creed—but it could inspire conduct; and that is the highest terrestrial effect of a creed. He walked, he ate—and what is more, ate with impunity; and died a nonogenarian. After all it was a piteous sight to see the old patrician tramping along in all weathers with his dinner before him—an object, however, which could lure him to undergo all the inconvenience of exposure to bad weather in a tempestuous locality. His ambition, such as it was, was gratified.

At first "the turn of the hill" is scarcely noticed, and perhaps the only difference is that the individual does not come twice to the joint. Probably, too, the once cherished draught of ale is no longer so keenly relished. A slighter excess of alcohol is felt next morning than of yore. Perhaps gout has induced him to leave off port wine. But as years creep on the alteration becomes more marked; the ap-

petite generally is impaired; the palate loses its once keen edge; and the skill of the cook is no longer so successful in tickling the palate and the appetite; but as the latter fails so the gourmand becomes more particular about his dishes.

The teeth, too, fail; and the strong meat "giving a good bite," is no longer so easily masticated. Consequently *entrées* take the place of the joints, the steaks and chops, once so eagerly devoured. Spoon-meat is found more acceptable in every way. More condiments are required, and highly seasoned dishes find favour—for more reasons than one. Flatulence is the bane of advancing years; and for this the cook can do much. There is a tendency to constipation; and that too is a matter for which much can be done in the kitchen.

Before proceeding further it may be well to quote from "The Diseases of Advanced Life" by Dr. McLachlan, on the anatomical changes which go on in the viscera in age. "Participating in the general wasting of the organs and tissues, the stomach and intestines lose bulk and become thinner in old age. Their glandular apparatus is also atrophied. Many glands seem to have entirely disappeared. The wasting of the tunics composing the stomach and intestines is more obvious in the duodenum, jejunum, and ileum. In some cases it is carried to such a degree as to admit of the contents of the intestines being distinctly seen through the attenuated structures. In striking contrast, the larger intestines occasionally preserve their natural thickness, chiefly through a compensating hypertrophy of the muscular coat. The mucous membrane is usually paler than in the adult, and generally acquires an ash gray colour as life advances. In the stomach it is often traversed by enlarged veins, assuming a varicose character, which become more numerous in the lower portions of the intestinal canal, and are particularly conspicuous towards the termination of the colon and rectum."

Such anatomical details tell us that the functional activity of the digestive organs must be much impaired in age. The absorbent action must be crippled by the stagnant current in the swollen veins. The glands of the small intestine are atrophied. Consequently nutrition must be less perfect, and the food must be of the most readily assimilable character. No wonder

"The fair round belly with good capon lined"

shrinks, and that impaired nutrition leads to

"the lean and slippered pantaloon,
His youthful hose, well saved, a world too wide
For his shrunk shank"

as years go by.

Then the muscular wall is thinned in the small intestines and the vermicular activity in the bowels in consequence will be cut down; and the action of the bowels rendered sluggish. Then the varicosity of the lower bowel must favor piles, and other maladies at or near the anus.

The moral of all this is, that the assimilative organs as years advance are not equal to great demands upon them. To fast to enjoy a feast is no longer a safe practice; and the meals must be moderate in amount and taken at not too long intervals. "Once a man and twice a child" says the old adage. And the dietary of the very old is once more that of the nursery. Perhaps more condiments are required than of yore; but then that again is a return to early days. The flatulence of infancy returns in advanced life; and the food must be prepared accordingly. Small meals oft repeated become the rule. When any considerable bulk of food is consumed at once great disorder of the alimentary canal is set up. There is diarrhœa —sweeping the offending mass away—but liable to linger in a modified form; or there is obstinate constipation, when the bowel is unequal to expelling the load. In either case much trouble is apt to be set up.

Soups of various kinds, brown and white, thick and clear, of flesh or fish, ought to be thickened with broken biscuit, or some equivalent of cooked starch. Then might follow some fish, especially boiled white fish—best with a little melted butter. Combinations of fat and flour flavoured, are not good in the case of old people any more than in that of invalids. Perhaps some chicken curried, or a sweetbread might follow, with some stewed celery in winter, or cauliflower or some mashed potatoe; while some biscuit and butter complete the meal. In a very old person the dinner might consist of a small sandwich made with potted meat, followed by a milk pudding. Supper might consist of a boiled onion well buttered. For breakfast a plate of porridge, or its equivalent of some farinaceous food should come first; and then a little fish, or bacon, or an egg. Stale bread cut thin and buttered, or made into toast and eaten cold with butter, is much better than buttered toast, or muffin, or breakfast roll,—still hot from the oven. Lunch may consist of well buttered mashed potatoe, or "sugar corn" or peas where the teeth are fairly

good, and the individual patient enough to crush them instead of hastily swallowing them. Food that is easily swallowed is apt to be flapdragoned by old persons; just as it is by impatient children in the nursery.

On account of their flatulent tendency old persons are apt to eschew vegetables entirely, and banish them from their tables. Dr. McLachlan is opposed to this—"Many old persons have a dislike to vegetables of every kind, and entirely discard potatoes from their meals. A more unfortunate error can hardly exist. If persisted in, a cachectic state of the system is induced, and scurvy in one form or other is sure sooner or later to make its appearance. At least one or two potatoes a day should be taken, or an equivalent quantity of fresh succulent vegetables. The former most generally agree; but in numerous instances greens and spinach are easily digested; and it will be frequently observed that hearty and healthy old persons indulge largely in these, and much enjoy salads of every kind." It is obvious that the doctor in using the expression "indulge largely," means not "at once"—a most dangerous practice—but as "a habit" in small quantities at once.

The salts of vegetables are "very good for the blood," and are a matter of moment with elderly persons—which should not be lost sight of. Where there is an objection to vegetables or they are found to disagree, some means of supplying their salts ought to be adopted. Milk supplies them, and consequently milk forms a large part of the dietary of persons in declining years,—just as it forms a large part of the food of the young, before they can eat vegetables. So when the power to digest vegetables is waning, milk once more comes to the front. But milk may be found to be too constipating, and then it may be mixed with some mineral water as Vichy or Vals; when cold fluid chills the stomach—a very common occurrence —the fluid may have the chill taken off by warming the milk before adding the mineral water.

Or whey may be made, and a very pleasant drink it is, containing the milk salts and milk sugar.

Another fluid beverage which will supply a quantity of salts is beef tea (as ordinarily made). This must not be regarded as a food, or as a substitute for food, but as a pleasant beverage of stimulating character, and an adjunct to food. Indeed many elderly persons find beef tea a very agreeable drink in lieu of alcoholic beverages. For such purpose, and as a drink at table beef tea, as ordinarily made, with a little pepper and salt in it, is admirable.

Then again, a return to nursery food is food in the form of stewed fruit. The toothless jaws cannot deal with the firm apple as can the sharp unblunted teeth of youth, and consequently it must be baked or stewed; and very good such fruit is for elderly persons.

There is a medicinal matter connected with stewed fruit. When cane sugar is added by the cook the resultant product is apt to turn acid in the stomach with many persons of middle age and advanced life. In such cases it is well not to mask the acidity by adding commercial sugar, but to neutralise it by an alkali. This leaves the natural sweetness, due to the levulose sugar of the fruit, which is quite pronounced enough for elderly palates. The amount of bicarbonate of soda, to be added when the fruit is put into the oven, is as much as will lie upon an English shilling, or a German mark, or an American quarter dollar bit, to the pound of fruit. This is quite enough even for unripe gooseberries. Such stewed fruit is excellent, and will often agree, where stewed fruit as ordinarily prepared (*i.e.*, by the addition of cane or beet sugar) turns acid.

This matter will be referred to again when the dietary of the gout is considered, only there it is well to substitute the bicarbonate of potash for the soda.

Such stewed fruit with cream forms, or ought to form a regular staple in the dietary of old age.

By keeping the principles which should guide us in the selection of food, well in view, much may be done to preserve the aged organism in health. These matters of mineral salts, fruit salts, and vegetable or meat salts, are of much importance; and more attention may be paid to them with advantage.

Milk puddings of all kinds and made with flour, maize flour, broken biscuit, rice, sago, tapioca, and semolina should form part of the dinner, at least, with all old persons. Porridge, or some similar dish of oatmeal, hominy, or any prepared cereals should always be a part of breakfast. The rule that all farinaceous matters should be exposed to a high temperature for some time before being used for the cook's purposes should no more be forgotten with culinary preparations for old folks, than it should be omitted in preparing nursery food.

The digestive ferments (like the rest of the body) are not so active in age, and so all food should be carefully prepared; and predigested starch is easily obtainable. As there is a difficulty often in

maintaining the body temperature with old people this matter of soluble carbo-hydrates must never be forgotten.

There is a prospect of milk sugar soon being placed upon the market, and this will supply a need to delicate children and old people which is very desirable. It can be added to the milk and mineral water, or be prepared as a lemonade, or even be added to a meat tea,—not being too sweet to offend the palate when taken in such company.

When elderly persons dine out they often find the comestibles of their hosts deficient in condiments for them, and consequently they are troubled with flatulence. They miss their wonted carminatives. "A good old-fashioned plan of adding condiments to food without offending the palate was to make a pill or two of bread-crumb and cayenne pepper at table; and, so guarded, the carminative worked well. Some gourmets used to carry a small bottle of Nepaul pepper with them perpetually, so as to be prepared for any emergency in the way of lack of flavouring when dining where much seasoning is eschewed." (The Diseases of Sedentary and Advanced Life.)

All soups and all fish (except perhaps salmon) are suitable food for the old, so are oysters and clams; but lobsters and jointed shell fish are apt to disagree,—probably because imperfectly masticated. Heavy solid meats should be eschewed to a great extent. Light food as chicken, and rabbit, sweetbread, giblets and small birds and game are good. Sheep's head well cooked is admirable. Tripe too is excellent. Meat prepared by mincing or hashing (fresh meat being preferable to cold meat) is also good. A nice dish is prepared by stewing some hashed meat and adding a little floury potatoe with some pepper and salt; which gives vegetable matter as well as animal food in a readily digested form.

As the taste for sweets does not return with age, in the case of many old persons something of the kind of a relish is desirable. Potted meats of many kinds, beef, game, venison, are at hand. *Pâté de foie gras* is excellent, and might be more used with advantage—to say nothing of the gratification of the palate—much more than it is. Livers indeed, larded and roasted, may be used freely hot or cold. The Leberwurst of Germany rich in fat might appear on many a table and furnish a variety of food too much neglected. Caviare has its claims to notice. The roes and millets of herring fried on toast may be tried.

Oyster soup, a red mullet, a sweetbread, a partridge or a herring's

millet, followed by a digestive biscuit and butter with a glass or two of generous wine as Bucellas or Madeira, would form a "company" dinner for old folks,—to which the writer would have no objection to be invited.

Or a basin of whole beef tea with broken biscuit, followed by a milk pudding, forms a luncheon not to be despised.

CHAPTER XV.

FOOD IN ACUTE DISEASES.

"When life seems passing away under their eyes, the friends will often shrink from tormenting, as it seems to them, the sick man with food. Let them not despair: many a one has recovered after the doctor has taken his leave with a sad shake of the head, and without making a fresh appointment. And let them also be stimulated by the fact—namely, that the pains of death are aggravated, if not mainly caused by the failure of the nutrition. Even when apparently insensible, the dying suffer much increased distress from want of food, though they cannot express their suffering." (King Chambers.)

A great many sick persons are allowed to drift into a critical condition when ill—from which many never rally, because they are not fed—not furnished with such nutritive material as their enfeebled powers can digest. That is not a pleasant consideration, either for medical men or the bereaved relatives when some valued life has closed:

> "Oh, for the touch of a vanished hand,
> The sound of a voice that is still!"

Regret is unavailing when the deed is done, and the scene is closed. Depend upon it, myriads of our felllow-creatures have perished because those around them did not know how to feed them: and either withheld food altogether, or gave innutritious food, under a misapprehension.

When a person is ill, the digestive organs are implicated, and, probably, the digestive ferments are impaired, or scarcely formed at all. To pour food down the gullet and to have it assimilated, are two totally different things altogether. All that can be said is, that the food must first go down the gullet, else no digestion is possible.

Let us take a person who is laid prostrate, say by the shock of an accident, where there is a broken thigh, while but little fever is present. Here there is not the thirst of a sharp, pyrexial state,

and so there is not the acute craving for fluids. The food may consist of (whole) beef-tea, with a little broken biscuit in it, or milk, or milk and seltzer water; or milk-puddings—of malt extract, of stewed fruit and cream: and later on, any kind of soup. Then a little fish, a sweet-bread, or chicken, and so on gradually until the ordinary diet is ultimately regained.

But with fever present, as in the exanthemata, typhoid fever, or acute inflammation of the lungs, something more of the nature of a drink is desirable. The temperature is high and the fauces are dry, and the thirst is urgent. Consequently what is wanted is Potus Imperialis, Apple water, or Tamarind water, or Apple Toast water, or Apple Rice water, or the juice of fresh fruit as the red currant, the black currant, or the mulberry, diluted with water; all pleasant refreshing drinks; the nutritive value of all being very small. Rice water and barley water give something more nutritive than plain water and may be flavoured with any of the above. Home-made lemonade with a thin piece or two of the rind to give flavouring is excellent. Where cane sugar disagrees it may be made with malt extract, or Mellin's Food, or if the malt flavour is disliked, with milk sugar or levulose. Malt extracts with effervescing water are good. They supply maltose (grape sugar), soluble dextrine, some soluble albuminoids and some salts. Consequently they form an admirable food in pyrexial states. Then come the meat-infusions, as beef tea (as ordinarily made), mutton broth, veal tea, and chicken broth and eel broth, all pleasant stimulants, but lacking in food-value; and, unless some baked flour be added, not to be counted as food, but as pleasant beverages.

Milk may be given as whey, or diluted with Seltzer or other water. A great matter to be borne in mind with milk, especially in the case of typhoid or enteric fever, where the bowel is weakened by ulceration, is that it curdles as the first step in its digestion. When it curdles too firmly the curd does not fall to pieces, but travels along the bowel, a hard irritant mass, apt to lacerate the weakened bowel. This is no imaginary danger born of apprehension but a grim fact. At the London Fever Hospital a glance is always cast at the stools in enteric fever, and if hard white pieces of milk-curd are seen in the motion, measures are taken at once to remedy the hard curdling. A quantity of effervescing water is added, sometimes with some baked flour; so that too firm curdling shall not occur. Lime water is also useful. Sometimes a more pronounced alkali is indicated, as said before when milk was under

consideration. It is not enough to give milk in sufficient quantities, judgment is also required to see that the milk is not doing harm.

How much actual food is being given with the fluid *per diem* can quickly be gathered from a glance over the nurse's table of what is given, and this list should always be correctly kept.

There are other fluid foods which can be used for a change; there is gruel, or oatmeal and water (a very pleasant drink), or any farina may be used and be well boiled in water. All kinds of preserved subacid fruit as black or red currant jelly may be boiled in water, and on cooling furnishes a pleasant change. A little sugar or milk sugar may be added to give some more food-value to drink.

By ringing the changes on the above, and giving some grapes, or other easily masticated fruit, when in season, all that is ordinarily required is furnished to the patient. It is grape-sugar—the normal food of the body—which must be supplied to meet the oxidation of the high temperature.

By suitable alimentation the wasting is less, and the patient does not become so reduced, and consequently the convalescence is more rapid. Where beef-tea (as ordinarily made) is given alone on the misapprehension that it is a sustaining food, the system has to exist on its own resources, and too often the patient sinks into a grave not dug for him by disease, but by the ignorance of those who constitute the nurses and attendants. But this matter will be talked of more fully further on.

At this point something may be said as to the assimilation of food in acute pyrexial conditions. We have good reason for holding that the digestive ferments are enfeebled and present but in small quantity. Consequently we give saccharine matters and farinaceous matters which have been predigested into a soluble form. This relieves us of any anxiety about the saliva being inoperative. We can furnish to the body its own food proper (grape-sugar), without difficulty; what is perfectly soluble presents no difficulty; and fuel-food the body must have.

Fat is never relished by the acutely sick, and is usually loathed, so that it is carefully skimmed off the top of all meat broths. It is supplied in the milk which is the best and least offensive form of fat, and in a high state of subdivision. How far it is assimilated we do not know. Nothing may be said positively upon the subject.

Then comes the subject of the assimilation of tissue-food of al-

buminoids for histogenesis. This is a difficult matter and must be judiciously considered. Hippocrates insisted upon nutrition in fevers, and used barley gruel. Then came other views until the French medical men went to the other extreme and actually starved their patients to keep down the fever. Anything more abominable can scarcely be conceived. Under-feeding patients in febrile states however continued till Dr. Graves of Dublin set his face against the plan, and insisted upon more alimentation being given. The "feeding of fevers" was what he taught. This plan now universally obtains. "The great art of duly nourishing fever patients consists in giving a frequent, almost continuous supply of liquid nutriment, containing very soluble aliments in a dilute form"—so says King Chambers. And now a very unpleasant task must be performed, and that is a searching criticism of what the worthy Doctor says next. "The physician sees that a large supply of nitrogenous material must be wanting. The nitrogenous tissues are devitalised and drained away in a disproportionate excretion of urea and other organic compounds, and nothing is taking their places. Shall he act antagonistically and try to stop the passage of urea by the kidney? I do not know exactly how he would set about it: but I do know that if he succeeded he would do positive harm; for the worst cases of fever are those in which metamorphosis is active (as shown by the heat), while the excretion of urea is arrested as shown by the lightness of the urine), they resemble cases of uræmic poisoning from diseased kidneys. The other principle of treatment which I noticed in my introductory lecture would not perhaps be so directly injurious, but common sense would still allot the palm to restoration here. Let it be your chief aim to supply that which is passing away—nitrogenous tissue." Now the first sentence and the last sentence of this quotation point unmistakably to this, viz.: supplying to the body matter for histogenesis, for the repair of the wasting tissues. On referring to the lecture from which he quotes it seems he advocates "two or three ounces of milk every hour." He is not as lucid on this point as he usually is, but we must take the statement as it stands, viz.: that the "chief aim is to supply that which you clearly see is passing away—nitrogenous tissue." In the absence of context this means—if the sentence means anything at all—that we ought to supply nitrogenised matter to take the place of that which is passing away.

Now to this I demur. The tissues are melting down under the high temperature, and the danger to life is that the blood is becom-

ing surcharged with nitrogenised waste, until a condition of uræmia ("the typhoid condition") is set up. It is the amount of such waste in the blood which is the danger *par excellence*. To meet this we try to lower the temperature, to reduce the wasting process, and keep the kidneys in action to get rid of the excrementitious toxic matters. Now to give ample supplies of nitrogenising food to meet the waste going on, is a distinctly dangerous practice, it appears to me, as tending to increase the amount of nitrogenised matter of excrementitious character in the system. Products of retrograde metamorphosis are not solely furnished from tissue waste; they come also from the *luxus consumption* of our albuminoid food, and to give ample quantities of albuminoids is to increase the evil. Of course it is possible to contend that these proteid matters are never peptonised, and that they merely drift along the alimentary canal till they reach the point of exit. But then we are not certain that such is the case. Certainly if peptonised food be given there is no such escape. If peptones reach the liver it may be questioned, and pertinently questioned, if the liver—at a high temperature—can carry on metabolism and convert any of the proteid matter conveyed to it into serum-albumen for tissue repair. A downward career into kreatin, kreatinine, leucin, tyrosin and the other products of retrograde metamorphosis (some of which are toxic) seems infinitely more probable. To give albuminoids or tissue-food in ample quantities for histogenesis during pyrexia is, I opine, a mistake. We cannot be certain about it; but to my mind it is all Lombard Street to a China orange that instead of encouraging histogenesis we only increase the risk of uræmia, or the typhoid condition.

It is a matter which cannot be demonstrated; it must remain a matter of opinion and conjecture—at least in the present state of our knowledge.

(From some observations made by Dr. Ord and Dr. Broadbent at the opening meeting of the Medical Society of London, October 19th, 1885, it would appear that there is a certain antagonism betwixt histogenesis and pyrexia. Where histogenesis is active there is a lowered temperature. This absorption of heat is arrested in pyrexia and the heat lost in histogenesis is added to the heat of the oxidising processes; and so swells the pyrexia. The drift of this is that there is no histogenesis going on in pyrexia, where an active histolytic process is on foot. The subject is one which will well repay further investigation.)

Probably Dr. Chambers has failed to express himself clearly; for all the men with whom I have interchanged ideas on the subject see it in the light in which it is put here. It is now widely recognised that the estimation of the bulk of urea passed in pyrexial states—once regarded as so important—is fallacious; because there exists no means of telling which of the urea is tissue-waste, and what proportion of it is derived directly from the nitrogenised elements of the food which have never passed through the stage of tissue.

Of the importance of "feeding fevers" no one now entertains any doubt; but of the desirability of larger quantities of albuminoid matter in pyrexia the gravest doubts may honestly be held and expressed. We know that the muscular structure wastes and breaks down into *débris* in pyrexia; we know that subsequent repair takes place by the development of young fusiform fibres within the sarcolemna; but this last is a matter of convalescence when the appetite is keen, especially for animal food. There is the pulling down of an existing building, and the erection of a new one on the same ground; but the pulling down precedes the building up—the two cannot go on together side by side at the same time. Histolysis and histogenesis go together in health where balance rules. When the normal processes are perturbed, upset by pyrexia, histolysis is augmented, to be followed in turn by rapid histogenesis. But I maintain, a rapid histolysis is not accompanied but followed by a swift histogenesis, or tissue-repair. It is the difference of a pair of horses side by side and tandem.

It is well for the reader to determine in his own mind what are the facts—or perhaps rather the probabilities of the facts—otherwise in well-meant endeavours to do the fever-stricken patient good we may be but reducing the chance of survival; and but adding fuel to flame, by still further lading the blood with nitrogenised waste.

Dr. James H. Bennett has something to say about "Defective Nutrition from the Existence of Acute Disease," to this effect—"In acute disease the functions of nutrition are partially suspended, the digestive powers are weakened, or even for a time arrested; hence the loss of appetite, or even the absolute loathing of food which ensues. The digestive organs being unable to transform and elaborate food, an all-wise Providence preserves them from the labour they are unequal to perform, by destroying the desire for nutriment, and rapid emaciation follows, the more rapid the more complete the inability to digest food. The process of organic destruc-

tion or disintegration inseparable from the use of our organs and itself a condition of life goes on, accelerated perhaps by the disease; but the material to repair the loss not being afforded to the organisation it wastes in volume. Moreover, as the materials of organic combustion for the generation of heat are not elaborated by the digestive organs, the economy is obliged to re-absorb and consume its own fat,—deposited, no doubt, in its cellular tissue partly as a kind of reserve tissue. Thus it is that after an acute illness of two or three weeks the emaciation is sometimes extreme, more especially when from the nature of the illness it has been impossible for the patient to digest any kind of food.

"In continued fevers, in which the inability to take and digest food is all but complete, and which may last for weeks, it is often found absolutely necessary to give wine, or other alcoholic beverages, in order to afford to the organisation the elements for heat-generation, or organic combustion, and to retard the process of destructive metamorphosis of tissue. In the absence of such aid, the extremities and then the body gradually become colder until death ensues, as much from cold as starvation. In this case the human fire simply goes out for want of fuel; like a coal or wood fire that has exhausted all the materials of which it is composed, and which expires for want of their renewal."

But all along it is "fuel-food" not "tissue-food" for which Dr. Bennett contends so eloquently, and what is about to be said is a contention on the same lines.

Imperfect supplies of "fuel-food" to the wasting organism have the effect of permitting great emaciation, which more liberal supplies would prevent; and on the present plan of treating acute pyrexial maladies we certainly do not prevent wasting, and with it consequential weakness, as we might. Beef tea (however made) contains practically no fuel food, while milk contains but a comparatively small proportion of milk-sugar. Consequently our patients are apt to die—as they did under the French physicians who deprived them of all food and called the starvation plan *dieté*. They openly starved them to death; while we allow them to die by giving them insufficient food. The difference only lies in the cynicism of the Frenchmen. We stand by the dying patient's bedside and bewail the failing strength, talk gravely of the threatening exhaustion of the powers—and do nothing to prevent the oncome of this exhaustion. We see the wasting going on, and lament over it; but we do little, or nothing. We leave the patient to sink, unsuccoured

and unaided. We certainly give some alcohol—a readily oxidisable fuel-food—but we do not act efficiently. If the subject of exhaustion were only more fully and completely considered, we would know how to help and succour the sinking organism. At the recent annual meeting of the British Medical Association at Cardiff (1885) I read a paper entitled "When a Patient dies of Exhaustion what does he die of?" He dies because his body-store of fuel is exhausted; because we do not supply to him the grape-sugar which is the normal body-fuel, and his reserve stores of fat cannot be got at sufficiently rapidly. We starve our patients into exhaustion, and bemoan the fact; and then leave them to their fate, without doing anything to save them from it.

It is a grave and serious charge to bring against ourselves, and the matter, as the President of the Medicine Section (S. Wilks) observed, the matter is one of the very greatest importance. Do we, or do we not allow our patients to die from insufficient feeding? Not one person present at the reading of the paper disputed my proposition. It is true then that we do not feed our sinking patients as we should. We ought to supply to them grape-sugar in free quantities in order to conserve and economise the body stores. The beef-tea ought to contain well-baked flour (much of it soluble dextrine), or even milk-sugar or maltose, which is not too sweet for most palates. We should give lemonade made with milk-sugar, or levulose. Acidulated drinks with grape-sugar, or its equivalent ought to be given. Water is wanted to allay thirst, and drinks should be so made as to have a distinct "food-value." If the patient cannot take such drinks and will only drink water, then of course we are not to blame. But when the patient does not get the chance of such nutritive drinks then that patient is a victim to ignorance—a sacrifice simply. It is not a matter for demonstration, it is one which reason can determine; and if after this outspoken protest any reader of this work does not feed his patient properly by the light of science he is a murderer! There are sins of omission as well as sins of commission, and to allow a poor patient to die unfed, is like allowing a man falling overboard to perish by not throwing him a life-buoy, or a rope—when those are ready to hand. What should we say in this last case which would not apply to the first? Of course so long as we did not know what it was the sufferer needed there was no blood-guiltiness. So long as the different forms of grape-sugar were not to hand we were not blameworthy. But now that we know what is required, and, further, have the materials to

hand there is no palliation of the offence; no excuse! And one of the outcomes of systematic lectures on dietetics ought to be the proper and efficient feeding of patients in acute disease, and specially in pyrexial maladies; so that they shall not become wasted and exhausted—further than we can possibly help. "Knowledge comes but wisdom lingers" and now that we realise the importance of supplying grape-sugar to the economy in its day of trial, we can render efficient aid to the sick man battling with disease, and succumbing to exhaustion if we do not interfere.

What was written by King Chambers and quoted at the commencement of this chapter should burn itself into every reader's memory, viz.: that many sick persons pass into a critical stage—from which many never rally—because they are insufficiently fed.

What was the denunciation on those who gave no food to the hungry, no drink to the thirsty?—"Depart from me, ye cursed, into everlasting fire." And every man who has allowed a patient to die of exhaustion without having made a stout fight for him, deserves like Cain to carry the brand of murder on him for the rest of his days.

Even when the loathing for food is pronounced, it still remains possible to administer enemata of grape-sugar with meat broths containing salts and the stimulant extractives of meat, or when the typhoid condition is pronounced such feeding might still be continued. The patient must be supported in the hour of trial; and if this be properly done we may fairly expect a good percentage of cases to rally which now go on from bad to worse till death by exhaustion closes the scene.

I now add the Dietaries in use at the London Fever Hospital, from which it is clear that the patients there are not starved but have ample allowances of food provided for them.

The whole subject of the feeding of persons acutely ill and in critical conditions is one on which some instruction is desirable. Milk does not agree with all. Beef tea is a stimulant and not a food. What the patient needs is soluble carbo-hydrates, which can be given in various forms, which are not particularly expensive. What the Doctor wants is information on the subject of feeding. And if the Royal College of Physicians of London could for once in its history put its hand to a useful work and give the world some evidence of its utility, some excuse for its existence, instead of slumbering on and merely babbling in its dreams, it would be a very good thing. I fear it is vain to expect such activity from it. But

it seems the fittest body to undertake such a work. If it would only have one question on Dietetics in its examination for the superior qualifications of its Membership it would be taking a step in the right direction.*

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* From a number of experiments performed of recent years it seems that the digestive fluids and their several ferments are gravely impaired in acute disease. This fact adds strength to the views advocated in this chapter.

CHAPTER XVI.

FOOD IN CONVALESCENCE.

"In the management of convalescence the patient should never be permitted to sit out of bed till the strength be considerably advanced. It is better that restriction should be imposed a little too long than that any risk of relapse should be run.

"The next point is of still greater consequence—the proper regulation of the diet. In our experience, by far the greater number of cases of relapse take place from indiscretion in diet. It should also be strongly impressed on the convalescent that it is as necessary to guard against the quantity as the quality of food, particularly when there has been gastric irritation in the progress of the fever. The stomach may be able to digest and assimilate a limited proportion of food, but the indulgence of an extra ounce or two may induce oppression and a renewal of the fever. This organ in convalescence partakes of the external muscular debility, and the convalescent may as well expect to be able to carry a heavy load on his shoulders, as to digest an undue quantity of food, even of a suitable kind." (Tweedie, Article "Fever" in the Cyclopedia of Practical Medicine.)

When the worst is over, and the critical period passed, the prostration is great. Care in the administration of food and the exhibition of stimulants is still required. But shortly the sordes disappear from the teeth and lips, the brown fur clears off the surface of the tongue, and with these comes some return of the appetite, and a relish for food. The weakened condition of the organism, both in its whole and in each component part, must be borne in mind; and in all illness and debility the stomach is involved, and is functionally impaired; in other words, all sick and weak persons are dyspeptics,—and must be fed accordingly. Small quantities of milk and seltzer water, of whole beef tea, of meat infusions with soluble carbo-hydrates are required at frequent intervals.

And there is one point to be attended to in the feeding of early convalescence, and that is, not to raise the patient up abruptly in order to be fed. The heart structure is extensively disorganised by

acute and still more by sustained pyrexia, and a great many of the muscular bundles are reduced to a mass of *débris* in the histolytic process which has gone on, so that the heart-wall is weak, and to raise the patient suddenly is to throw the weight of the blood-column in the head and neck abruptly upon the heart. Under these circumstances the left ventricle is unable to bear the weight so thrown upon it, and comes to a standstill in diastole—flaccid and distended with blood. Even after the patient has recovered sufficiently to walk about the room this danger of heart failure is not fully past; and after the high pyrexia of relapsing, or famine fever, it is not unusual for the convalescent to drop suddenly to rise no more—the weakened heart having stopped abruptly.

The appetite for food steadily increases, and must be met. Small quantities of milk puddings of very digestible character may be given; such as those made with broken biscuit, or with shredded maize, or cooked hominy, or indeed any farinaceous matter which has been already exposed to a high temperature. Milk or cream with cold coffee forms an admirable nutritive beverage. There is often a considerable amount of thirst lingering, and this calls for beverages, which can easily have a food value given them either by some form of maltose or grape sugar, or by adding some baked cereal. Gruel made with baked flour, or baked oatmeal is good. The lactated foods can be used, and if need be, may be flavoured by red wine of any kind, or by some other flavouring agent. Lemon juice suggests itself as a pleasant acid assuaging thirst effectually. Sago and rice milk may be added, and oatmeal and hominy porridge make a change. Blancmanges suggest themselves, but should not be made of raw or uncooked starch. The salivary glands still feel the storm which has swept over the organism, and have not regained their capacity to digest starch. To forget the fact is to run the risk of filling the enfeebled stomach with undigested starch—just about the most effectual means of upsetting it that could be devised. Dr. Tweedie warns us against errors in alimentation in convalescence, and this is one of the most common. A little later on, an overload or surfeit is apt to occur from the appetite being too keen, and the quantity taken at once too much for the stomach. A greedy feeder is most liable to this last risk of relapse; but all convalescents may experience a "back-cast" from a quantity of undigested starch finding its way into the stomach.

Then the patient advances to some white fish boiled, to a sweetbread, to some chicken. It is not necessary to tempt the appetite

by condiments, the palate declares for simply dressed food. The plainer the food the better. The palate requires no tickling or stimulating; the desire for food is keen, and eager enough to do without any whetting. It is not like the invalid's case where the appetite is small and fastidious. Young convalescents from acute disease, can generally eat anything offered to them; and consequently those in attendance upon them should exercise judgment in the selection of the viands supplied to them. They eat and go to sleep, —to waken up with a craving appetite.

There has been a severe demand upon the body stores of food which have to be built up again. There has been extensive destruction of the muscular tissues by a rapid histolysis,—the tissues melting down rapidly under a high temperature. All this has to be met and repaired; and the appetite is keen, and the digestion active and rapid. Nevertheless it is well to commit no error; as all persons familiar with disease and convalescence know that a relapse is followed by a slower rate of repair. Once a "back-cast," and the process of repair and the progress of the convalescent are alike slowed. A maxim with Sir Frederick Roberts in his Afghan experience was, "When you have once got an Oriental on the run, keep him on the run." If his flight was not kept up he might rest somewhere where it might not be so easy to dislodge him; consequently, it was best to keep him going. So it is with convalescence, it is best unbroken and uninterrupted. Once a check, and the onward progress has again to be initiated. And all initial movement is slow even in a Great Northern Express. Every stop involves a fresh start. Carefully then, and with caution liberal supplies of food may be given to the convalescent. But it must be borne in mind there are convalescents—and convalescents. There is the robust hardy youth who has had a smart attack of enteric fever; as soon as his appetite returns he can eat anything, a sheep in its wool almost. But there is too, a delicate girl recovering slowly from an attack of scarlatina, with kidney complications. She is a very different convalescent; there is the injury done to the kidneys to be kept in sight, and never forgotten. The kidneys are a great factor in the elimination of nitrogenised waste. While they are still feeling the effects of the disease which has passed over them, they are not equal to great demands upon them; and this functional debility must not be overlooked or even underestimated. Small quantities of animal food alone are safe here. The hungry youth who can scarcely wait till the sheep is skinned would be tortured and injured by the small

meals, sparingly composed of animal food, which would be proper in the other case,—while aliment suitable enough for him would be fatal to the girl in all probability. "What is one man's food is another man's poison."

The importance of bearing in mind the function of the kidneys in the dietetics of convalescence is illustrated by the following case. In my early days of village practice in Westmoreland, a case of nephritis came under my care,—a typical case of acute Bright's disease, not post-scarlatinal. By suitable measures convalescence was secured. I was but a young practitioner, and though the case was doing well somebody thought it might be doing better. So an older man was called in, who thought I might allow some more food and administer some steel. Accordingly, this was done, and for a day or two all went well. Then came a change sudden and rapid; in spite of all that could be done uræmia set in, and the girl perished. That case has been one corner-stone in the building of my medical experience. Regret was unavailing; and I went on a sadder but a wiser man.

In like manner after enteric fever it is well to remember that there has been ulceration of the bowels, often extensive, sometimes deep, and that hard pieces of food—as unripe apple, or insufficiently cooked potato—might readily cause a perforation of the weakened bowel. My repertoire contains no warning case telling of forgetfulness here, which could be placed at the reader's service. A medical experience involves a certain element of patients sent to their doom by some sin of omission or of commission, and mine is no exception.

But my experience can tell of a very instructive case anent convalescence; and the recital may help some reader in a difficulty. In my early days an old peasant woman was seized with complete suppression of urine. She was a hale old dame, and after three days or so of active treatment, the urine reappeared. Of course a careful examination of it was made, and some tube-casts were found. Taking what Sir Thomas Watson said about tube-casts as my guide, I gave it as my opinion the old crone would not long survive the attack. This coming to her ears made her very wroth, and she at once transferred her professional confidence to an irregular practitioner in the neighbourhood,—who was always in demand whenever the regular practitioner's opinion was unfavourable, or his advice distasteful. His opinion was that she only wanted something to eat and drink, and she would do well. This advice was promptly followed, and carried out with the most satisfactory results to the

patient. She glowered at me with evil eye, whenever I happened to ride past her cottage, and held the poorest possible opinion of my professional capacity. And well she might, for eighteen years have passed and gone since then, and she still lives to bear her testimony to the erroneousness of my opinion in her case.

A very common cause of interruption to the progress in convalescence is an excess of food. There is discomfort with a sharp rise of temperature, sometimes vomiting, commonly some purging, with the result of clearing the system. In strong organisms these intercurrent derangements produce little or no effect; but with delicate individuals they are fraught with a certain risk to life, and too often have a very malignant effect upon the onward progress of the case. In those who have been very gravely ill, and in those who have any constitutional delicacy or special gastric infirmity the very greatest care must be taken. Such a case came under my notice lately. A delicate girl had a slight pneumonia with a good deal of gastric irritability. By very careful dieting she went on very satisfactorily and seemed likely to weather the storm; but just as she seemed "out of the wood" an injudicious meal inaugurated a rapid downward progress.

Light food, as chicken, rabbit, game, and small birds must prepare the way for chops, steaks, and a cut from the joint, together with suitable vegetables. The dietaries of the London Fever Hospital may be adopted until the whilom sick person is out of the doctor's hands.

The amount of food a strong and previously hale young man will eat in a day, after an acute attack of fever is something surprising. We hear of eight or ten meals a day, and pretty good meals too, being taken under such circumstances. In fact, the convalescent wishes to be back to his place in the world and to his work, and he expedites his progress thereto to the best of his ability. But there is an old adage which says—"The more haste the less speed," and sometimes this is the case.

It is not always desirable that the plentiful dietary of the convalescent be too rich in albuminoid materials. No doubt there has been tissue-waste, often extensive, and material is needed for its repair. But this end is not always served by liberal supplies of albuminoids. Some time ago, a young army surgeon who had had a sharp attack of enteric fever in India, wrote to me to tell his history. His heart was considerably weakened by the tissue-destruction which had gone on in the pyrexia; and he made his way as speedily as he

could to a French cook, whom he found in Bombay. Here he went in for liberal meals supplemented by generous Burgundy. But to his great disappointment he did not improve as he had anticipated. On arrival at Aldershott, he found a friend deep in the perusal of my work on "Indigestion and Biliousness," who drew his attention to some remarks therein, as to the difference betwixt merely swallowing food and its digestion, and the importance of light food where the liver cannot deal with a large quantity of proteid matter. His own plan having failed egregiously, he determined to accept my suggestions. He put himself upon farinaceous food and fish—matters his liver could deal with—forthwith, and the results were so satisfactory, that he made my acquaintance in order to report to me the (to him) wondrous results.

Where the liver is weak it is not well to overload it by an excess of albuminoids, for the burden only deepens its mobility to carry on the metabolism of proteids.

CHAPTER XVII.

FOOD IN GASTRIC AFFECTIONS.

In this chapter it seems desirable to commence with the slighter forms of trouble, and to proceed, later on, with the consideration of the graver forms. Indigestion will be dealt with in a later chapter at full length; the present consideration being devoted to positive disease of the stomach.

The main maladies of the stomach are catarrh, atrophy of the glands, gastric ulcer, and finally cancer. In the first there is a quantity of ropy mucus given off, and as the food in the stomach is rolled over and over it becomes gradually covered with a wrapper of this mucus, upon which the gastric juice is impotent to exercise any digestive effect. The food with some gastric juice is like a pudding in a bag, and feels like a dead weight in the stomach. It is quite obvious that in such a case all solid food must be religiously abjured; and such food only be taken as can not be so enfolded by mucus. Fluid food alone must be taken—that is obvious.

Atrophy of the glands of the stomach involves functional incapacity, and only food of the most digestible nature should be taken. Food which is not acted on by the stomach so much as by the pancreas is here indicated, and that means that milk should form a large portion of the dietary. Farinaceous matter is objectionable—but not so predigested, or soluble carbo-hydrates.

In gastric ulcer there is little or no discomfort while the organ is at rest, but as soon as food enters it pain is set up. This is due partly to the acid gastric juice irritating the raw surface of the ulcer; partly to the dragging upon the base of the ulcer caused by the muscular movements of the stomach set up by the presence of food. Vomiting at once gives relief from both causes of suffering. Here alkalies are indicated, and milk containing some alkali is about the only food that can be taken without suffering.

In cancer of the stomach pain is set up by movement no doubt, but there is also pain when the stomach is empty. Commonly the cancer is seated at the pyloric ring, and pain is caused by the passage of food out of the stomach. Here only the most digestible of

foods can be taken without suffering, and towards the end all food aggravates the suffering.

To show what may be done by a suitable dietary, the following case is instructive. An old lady at Brixton suffered much from pain and sickness caused by cancer of the stomach. A lump as big as a doubled fist could be distinctly felt. Yet by putting that old lady on a strict dietary of fluid food and predigested carbo-hydrates the stomach quieted down, there was no sickness and no pain, and at the end of a week the friends asked the regular medical attendant if there was not some mistake in the diagnosis. So great was the relief afforded that the patient lived on until cancer broke out elsewhere; indeed it was some months before she succumbed, when she had only seemed about a week from the inevitable end when the change of food was begun.

The great matter about any disease in the stomach, any gastric irritability which may crop up as an intercurrent trouble in the course of other maladies—as phthisis for instance—is to introduce but a small bulk of food at once into the stomach. That is the fundamental matter to be kept ever in the centre of vision, and not only that but well focussed. It is too, the central affair round which all the rest turns. Metaphors and similes might be multiplied indefinitely, but no amount would be too great for the subject matter. "Bulk" is the first thing to attend to.

Small quantities of meat broth thickened with baked flour but so thickened that the eye can detect no mass; milk with Vichy or Vars, or other like waters, these are the staples of the dietary. To these may be added malt-extracts (marvelous food in bad gastric cases) where the patient does not dislike them. Small quantities of the syrup of stewed fruit are often grateful to the patient. But in the milder cases, some boiled white fish may be borne and forms a change. Sometimes a very strict diet, with the patient in bed to economise the powers and reduce the body-expenditure to a minimum may be enjoined for a definite time, as a curative course in ulcer or catarrh. Such a severe regimen, eked out by nutritive enemata, will do much towards a cure, even in very bad cases, and achieve one in slighter cases.

When there is a great excess of acidity, vomiting gets rid of much of the offending acid. Milk is returned in firm curd; and must be given with some fixed alkali, as prepared chalk, or light magnesia—as much as will lie on a six-pence, or sometimes even a shilling, to the half-pint—as lime-water or aërated alkaline waters

are not strong enough to neutralise the acid. Here, means potent enough to secure the desired end are essential. Meat infusions, with prepared carbo-hydrates, may be exhibited. Cane sugar is an abomination in these cases. When slight but chronic acidity is complained of, cane sugar must be abandoned, and other forms of sugar not being beet substituted for it. Indeed, briefly, suceroses or crystallisable sugars, which readily undergo acetous fermentation, must be given up, and glucoses, or uncrystallisable sugar, taken in their stead.

In those cases where thirst prompts the sufferer to gulp down a good draught of fluid, which the stomach promptly rejects and ejects, it is well to give the patient small pieces of ice to suck. The melting ice cools the dry fauces; and, introduced in this gentle manner, the stomach tolerates the presence of fluid. It is possible, by the use of ices containing fruit syrup or cream, to introduce a small quantity of nourishment into an irritable stomach. When the stomach is in active revolt and objects to all contents, it is a matter of life or death, very often, how far food can be introduced into it. Hunger and thirst both are experienced; while in many cases the patient manifests an intense dislike to feeding *per rectum*. Where the latter is well borne, the difficulty is small; but where the objection to enemata is insuperable, the greatest difficulty may be encountered.

When the quantity or bulk of food which is tolerated at once, is small; the meals must be the more frequent. If they are sufficient to be called meals, they should be of the full number—breakfast, eleven o'clock, luncheon, tea, dinner, and supper. Half a dozen by no means too many. When only two or three ounces of fluid food can be taken at once, then the feeding times should number a dozen in the twenty-four hours. Where only a very small bulk is tolerated, every hour is not too often. The smaller the bulk, the shorter the interval—else the patient will starve.

Sometimes the patient loathes the only food which is suitable—hates beef-tea, cannot take milk, eggs disagree; (and often the yolk of an egg is good, where little can be borne at once.) What is to be done? Try a teaspoonful of malt-extract every hour. Being a new food, not handicapped by memories of associations, it gets a fair trial, and often succeeds, especially with females. Or a small piece, the size of a Barcelona nut, of *Cremor Hordeatus*, may be tried hourly.

The resources of the physician are often taxed to the utmost in

troublesome stomach cases, but success often is the reward of extensive acquaintance with food of all kinds and qualities. But then, this acquaintance is only possible by long, watchful attention to the subject.

The principles of feeding in gastric cases are the same, whatever the form of disease, though in minor points some variation may be suggested by the individual exigencies of each case. The digestive act remains the same, whatever the precise form of disease. Small quantities of readily digestible food at once, is the secret of success. Enemata of soluble carbo-hydrates and peptonised meat come in very conveniently—there is no palate to be offended in feeding *per rectum*.

Of course, there are always the individual likes and dislikes to be encountered; as also the fact of certain foods disagreeing with the patient: two matters which often tie one's hands very awkwardly in dealing with cases. And it is in women—in whom, as compared to men, assimilation is imperfect—that these disturbing factors are encountered most frequently. When the assimilative power is very small, the patient must be put to bed and the room kept warm, to reduce the body-expenditure to a minimum. The amount of food which will "sustain" life under these circumstances, is surprisingly small. And after a period of comparative rest, the appetite and power of digestion return. Such a case was put on record by Professor Seegens, where for thirteen days, but thirty-five grams (515 grains) of milk were the sole food. After that, the appetite returned, and considerable quantities of milk, an egg and some arrow-root, were taken daily. It is possible, too, to give some food to such patients by having them rubbed with oil. Absorption by the skin, even if small, is of priceless value in an emergency of this nature, when, indeed, every little helps.

Sometimes violent and irresistible cravings for food of the most apparently unsuitable character are experienced. It becomes, at times, a matter of no small difficulty to decide upon whether these cravings shall be gratified or not. Experience has shown that frequently the food so craved for has agreed, despite all *a priori* objections; and consequently furnishes an argument for yielding to the patient's desires. Granting these exceptions to the rule, the broad rule remains of small quantities of liquid food at frequent intervals in all cases of disease of the stomach. Of course, this does not thrust out of sight the fact that the stomach requires its own intervals of physiological rest; but the smaller the meal and the more digestible its nature, the less this interval is.

CHAPTER XVIII.

FOOD IN STRUMA.

This is a very important matter at the present time. Struma is the word now in use in lieu of scrofula. Scrofula was applied to that suppuration of the cervical glands which followed upon enlargement of these glands; and got its term from Scrofa, a sow, from the porcine appearance of the neck. This it was which caused the Prince Regent to adopt those voluminous neckties which were worn in the early part of the present century. It was vulgarly known as "the King's Evil" because it was believed it was curable by the royal touch. Probably there was something in this, but indirectly, not directly. The child which succeeded in getting access to the royal touch would probably after that get the superior feeding and regimen which is so useful in strumous, or scrofulous affections.

Struma is closely linked with, if not really a depraved organism, with tissue-degradation. There is a certain enlargement of the epiphyses, often noticeable in the knotted fingers, large at the joints, the bones as a rule being small and light. The muscles are small and apt to be flabby. The lips are thick and so are the alæ of the nose. The eyebrows are often well-marked, and either straight or highly arched. The little fairy child, usually a girl, with blonde hair, well vaulted forehead, clearly defined eyebrows, pouting lip, and archness of expression, with long silken eyebrows, is a strumous child; and will usually not survive childhood. It is a contrast to the heavy plain child of coarse lineaments, thick lips, broken or stunted eyelashes, enlarged cervical glands, and clumsy form, not uncommonly seen: both are alike, if not equally strumous. The great lexicographer, Sam Johnson, had distinctly strumous features, with the knobby hand of confirmed struma. He was one of the last who was touched for the "King's evil"; and though he does not seem to have benefited much therefrom was a bigoted uncompromising true-blue Tory all his days. Professor Laycock said of persons of the strumous diathesis, that they exhibit "a defect in vital force manifested by defective nutrition, imperfect development and deficient function." And also of their bony development that

it is "of a retrogressive type towards the infantile or a lower ethnic form." Of the nervous system it is "irritable, feeble in tone, mind precocious, but mental powers imperfect, or if good, soon exhausted," a "lower ethnic form" of individual marked by precocity and early exhaustion. In its slighter forms struma gives us our type of beauty; but it is an unhealthy type. The precocious fairy child will never make a strong healthy woman, fit to be the mother of children.

Of what may be called the cause of the strumous taint, the deterioration of the physique, the following illustration is fraught with instruction. In my early days of practice in Westmoreland a family tainted with struma were among my patients. The father was a man of fair physique of the nervous diathesis; while his wife belonged to a moderately strumous family. In their early years of married life they were prosperous as working folk, and their first children manifested little of the strumous taint,—had indeed just enough of it to give piquancy to the expression. Then the father took rheumatic fever which injured the valves of the heart, and crippled him so that he became very poor. The children born during this time had more marked struma; their noses were stubby and their eyelashes broken and defective. Then the father had some money left him, and their circumstances became easier and their regimen better. The two children born after this improvement in their circumstances resembled the first-born children in the slightness of their strumous taint. The family group was a most instructive one.

One curious matter there is about strumous children, and that is the amount of uric acid in their urine. They also are liable to acid, or sour perspirations.

Struma is a departure from the normal in a downward direction, both as to development and nutrition; and, consequently, has to be met by good food, fresh air, and indeed, everything which will tend to raise the *physique*.

In the first place, it is very undesirable that such a child be suckled by the mother; especially if the struma come from her side. When a wet nurse is sought she must first be a perfectly healthy woman, and then Dr. Combe ("Physiological and Moral Management of Children") thinks "that the nurse should resemble the mother in all the characters in which the latter can be considered healthy; she should be nearly of the same height and bulk, for it has been noticed that the child of a tall, thin woman

rarely thrives upon the milk of a woman of short stature and thickset. It is also of great importance that she should have been delivered as nearly as possible at the same time as the mother; a new-born child nursed upon milk a few months old is very apt to become scrofulous."

Now that the wet nurse is going out of fashion, attention to her is less necessary than it was. But the milk supplied to the child should be of excellent quality, and if possible not that of stable-fed cattle in town dairies. "It is a curious fact that the milk of a tuberculous cow—an animal which is very subject to tuberculous diseases, when confined in stables, as they frequently are in large cities—has been found to contain seven times as much phosphate of lime, the main ingredient of scrofulous tubercle, as the milk of a healthy animal." (Baudelocque quoted by Lugol "On Scrofula.") The milk should be from a country-fed cow, living in what may be termed a normal manner, and leading a natural life. Not only should such children be carefully fed, but they should be reared in the country under circumstances the most favourable for encouraging development. And without this Sir J. Clark thought "all our efforts to improve their health will fail." The good food must be backed up by every other advantage. "The scrofulous child should not merely live in the country but should be as much as possible in the fresh air. I have frequently had occasion to notice the extraordinarily good effects which an out-of-door life produces upon scrofulous disease in the case of children who during the period of gleaning are in the fields from sunrise to sunset for days together. Scrofulous glands, as well as other forms of strumous disease, frequently undergo a notable amelioration during this time." (Lugol.) The advantage of sending such children to the seaside, where the whole day is spent in the open air when the weather permits, is obvious. "The seaside and cod-liver oil" is the routine prescription for such children when affected with some scrofulous trouble in their joints.

There is in strumous children much tendency to disease of the bones. The ribs have thickened epiphyses at their cartilaginous extremities; "the rachitic garland" is the name given to the festoon of enlarged costal epiphyses.

Morbus coxarius is also common, from some shock, as a leap from a considerable height, bruising either the head of the femur, or the cup of the hip-bones. Disease of the elbow and knee is also frequent. The spine is apt, too, to be affected, and gives way into

single or double curvature, or even caries. The music-stool giving no support to the back has been held largely to blame for this. In the old starvation days for school-girls, the imperfect osseous development of struma was very frequent. In a large school visited by Sir John Forbes, not one of the forty girls was free from some crooking of the spinal column. And of these school-girls Sir J. Clark said—"While the natural form of the body is destroyed, the general health suffers . . . In short, all the requisites for the production of struma may be found in a large proportion of boarding-schools when the system described was pursued." But any such expression of opinion about boarding-schools at the present day would be incorrect and unjust. Still the matter of feeding delicate children, and especially girls, is a very important one, in the matter of girls more than boys, because the advent of puberty and the in-rush of new ideas consequent thereupon seems to affect more the palate in them than boys. Slate pencil and chalk seem the articles most craved after by the depraved appetite of school-girls; and neither have a food-value, while the chalk locks up the bowels. Consequently, great care and supervision is requisite to prevent girls eating what they should not have; as well as to see that they eat what they ought to eat.

Strumous children, from an early age exhibit a strong tendency to form an excess of uric acid.* It is seen in crystals in the chamber utensils; and gives rise to sour acid perspirations. (It is not asserted that uric acid is found in the perspirations, only that they are sour.) Probably this has something to do with the good effects of potash upon strumous children, to which Lugol bore his testimony. He observed that the administration of potash had a good effect upon the maladies when present, "without in any way lessening the tendency to a fresh tubercular deposit."

Where it seems desirable to administer potash (which is not very palatable), it may be given in the following manner, without offence to the palate. To each pound of fruit when put into the oven to stew, add as much potash-bicarbonate as will lie on a dime or a quarter bit—(in English, a six-pence or a shilling.) This will neutralize the excessive acidity without the taste of potash being present. Then some sugar may be added. Such stewed fruit with cream, would form a desirable factor in each day's food.

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* Professor Laycock pointed out how struma is a return to a "lower ethnic form;" in this tendency to form uric acid, we see a return to the primitive form of urinary products—the urates of reptiles and birds.

Then comes the question of fat. Fat is necessary for the formation of healthy tissue; and when there is a distinct tendency to tissue-degradation fat becomes even more imperatively essential. But then the strumous child turns away from fat with loathing. It revolts from a piece of sweet animal fat; it turns away from nursery bread and butter when a stout slice of bread is covered by a thick layer of butter. How then is the requisite fat to be introduced into the organism? By means of cod liver oil given an hour after each meal! Certainly; but is cod liver oil the best or the most desirable form of fat? That may be questioned. Professor John Hughes Bennett introduced the use of cod liver oil; but Lugol had no experience of it, he says. Its use soon became general in all scrofulous and tuberculous affections; and what is more, it has stood the grim test of time, and holds its ground as firmly as ever.

The fishy oil is relished by many children when on *a priori* grounds it might be thought the child would dislike it. On the contrary, it is taken by many delicate children as readily as is a piece of whale blubber by an Eskimo baby. The fat seems to meet an instinctive want. Dr. King Chambers tells the tale of a phthisical Skye terrier who whined for his cod liver oil if forgotten. Other children take greedily the oil from canned sardines; a form of fat very good for them.

Then there are other ways of introducing fat without offending the eye or the palate. Of these, milk stands first and foremost; either plain, or as milk puddings, or as an adjunct to porridge. Then cream may be eaten with stewed fruit. Cream too may be served up at table as cream moulds variously flavoured; containing cream with some farinaceous matter; or as meringues. As whipped cream it is a pleasant accompaniment to many cold puddings. Then there is butter, which can be added to bread, and some potted meat in thin sandwiches, where something tasty is relished; or it can be added freely to mashed potatoes, or eaten with milk puddings either hot or cold. It is to be found in oleobyne. Where economy is a matter of moment then suet puddings suggest themselves. Bones cracked and stewed with rice are an excellent fatty food, cheap and wholesome, the marrow fat being a very digestible form of fat. The baked beans of New England furnish a large proportion of fat in a pleasant form not likely to offend the palate. This also is an economical food.

Then there remains one more food, rarely looked at from a food-value point of view, and that is "Toffee." This compound of fat

and sugar is acceptable to the palate of most youngsters. The old original toffee, made when butter was cheap and sugar dear, is the form to be adopted when it is desirable to afford fat to the system. The increasing price of butter has reduced toffee (in most instances) to the level of a mere carbo-hydrate; well enough as a fuel food, but inoperative for tissue construction. In my experience many a little strumous child whose palate revolted at cod liver oil has been saved from death by liberal supplies of toffee:—though its mention usually provokes a smile of derision and a sceptical remark from the mother. She soon however sees for herself the beneficial effect it produces. Incredulity gives way to gratitude; just as of old those who came to scoff remained to pray. There is other conversion than religious conversion !

In struma advantage can be taken of the ready absorption of fat by the skin. Children readily admit of cutaneous inunctions being applied to them. In a warm room the child's trunk and limbs can easily be sponged over with warm water and soap so as to cleanse the surface, after which oil, which has previously been warmed, can be applied. It should be rubbed over the skin freely. This can be done one or twice daily. Cod liver oil probably is most readily absorbed, but its smell is objectionable. Then comes neat's foot oil, also an animal oil; olive oil is less offensive than either. Such inunction in cold weather forms a good protection against cold.

After a suitable regimen under favourable circumstances, as an outdoor life at the seaside, the system will often greatly outgrow its strumous tendencies, and a fairly healthy organism be attained; where if no steps are taken the system simply gravitates deeper and deeper into confirmed struma; and sinks ultimately under some tuberculous or scrofulous disease. The preventive treatment of strumous affections is a great matter. When some joint has been excised or mischief shows itself in the mesenteric glands, or the lungs, the above scheme and regimen have to be adopted as a curative measure.

The great food for the strumous is "Fat."

CHAPTER XIX.

FOOD IN ANÆMIA.

THERE is a tendency in youth and especially with girls to become anæmic, or bloodless. Why this should be is not very clear; but it seems probable that the demands, of growth, of puberty, and of work, school or other, made upon the organism, lower the capacity for sanguification. No doubt in some cases inherited syphilis is a factor. Then exposure to malarial influences interferes with the formation of blood-corpuscles, as well as, probably, leading to the rapid disintegration, or wearing out of these fine bodies. Any blood poison carries with it a tendency to anæmia, and often to neuralgia. "Pain is the prayer of a nerve for healthy blood," said Romberg; and pain is found, especially neuralgic pain, wherever the blood is impure, or deficient in quantity. Consequently, we find neuralgia under the most opposite circumstances, viz., blood impurity on the one hand, and poverty of blood on the other. Anæmia then may be simple from defective blood-formation; or complex, where there is a blood-poison operating injuriously on blood formation, perhaps even also destroying the red blood corpuscles.

(It may be said for the instruction of non-medical readers that the blood corpuscles do not feed the tissues, they are fed from the serum, or *liquor sanguinis* of the blood. Still, when sanguification is good the general nutrition is not amiss.)

It has been pointed out in a previous chapter that the ordinary nutrition of the body is but metabolism of materials furnished by the food, except in two matters: 1, the hæmaglobin of the blood; and, 2, the lecithin of the nervous system. Hæmaglobin is a very complex body in which iron is a factor. The treatment of anæmia is not merely the administration of chalybeates; though this is an essential part of the treatment usually. If some specific poison be present in the blood, as syphilis, malaria, mercury, gout, or cholæmia, it is useless to give iron until the digestive organs are in good order (as a rule—to which however, there are some exceptions). The specific poison must be met by its own antidote in order to give the organs involved in sanguification a fair field. This is often

readily seen by the inutility of steel and good food in a case of anæmia in which syphilis is a factor, until the proper treatment of the taint is superadded; and then the difference is noticeable at once. The treatment of anæmia often fails from ignorance or forgetfulness of this fact. It is not uncommon in cases of gout and biliary disturbance to find that weak anæmic persons have been taking steel and quinine most carefully for some considerable time without any good result; and yet, as soon as the gout poison is met by potash, or the liver put right by hepatic stimulants and cholagogues, improvement at once sets in. When a certain point has been reached, then the iron comes in most usefully.*

These matters, lying somewhat outside pure dietetics, must be pointed out in order to prevent disappointment. Valuable as a knowledge of dietetics undoubtedly is, it must be remembered that feeding cannot do without medicinal aid in many cases. A man who has lost both legs would do little with one crutch.

Purity of blood and iron to enable hæmaglobin to be made are essential to the treatment of anæmia; but proper food also is requisite. The food should consist to a considerable extent of animal food (except in gout and cholæmia) at least when the case has made some progress. At first in anæmic cases in girls it is well to send the patient to bed. The assimilative powers are feebler and cannot digest enough to feed the system, and meet demands on the body as well at the same time. To send the patient to bed to lessen the body-expenditure is the first step. By so doing even a very feeble digestion can supply the wants of the organism, with a little to spare for improvement. "You cannot eat your cake and have your cake" says the old adage. No more can a starving organism use up each day's income and expect to store and garner strength. A few days in bed is the proper start in marked anæmia, especially with girls. This is a lesson experience has taught me with some humbling of self-pride. Pain is of various kinds; and wounding of the self-pride may make as enduring an impression as the infliction of physical pain—as when they flogged certain healthy boys in order to imprint the locality on their memories in the old rude method of "riding the boundaries." Such a case occurred to me when attached to the West London Hospital. A pallid nurse-girl was an out-patient

* Why iron is less useful in anæmia linked with the formation of blood poisons within the body than in other forms, it is impossible to say, but the fact remains.

under my care for fourteen months, and despite all my pains and every combination of iron with tonics, made no progress. One day going through the wards, there was my intractable patient getting on famously in bed on the ordinary chalybeate mixture. So long as she was doing her work—eating her cake—she made no progress; as soon as she was placed at rest in bed the body expenditure fell below the body income, and improvement became possible.

Where the assimilative powers are feeble it is of no use to pour in liberal quantities of animal food. It is not what is swallowed but what is digested that gives strength. Animal broths (containing some of the muscular fibre) with some farinaceous materials, often all the better if previously rendered soluble, must alternate with meat. As improvement goes on the dietary may be made more liberal. A great matter is not to over-run the powers, and have to turn back and start again. Whenever the tongue is seen to be covered with a brown fur then the chalybeate must be withdrawn till the tongue cleans; when it may be resumed in small quantities and its effects carefully watched. However anxious to get on, care and caution must be practised. In simple anæmia after the first slow initial progress it becomes possible to push on with liberal supply of food, containing a fair proportion of meat, combined with fresh air and exercise. A walk should precede the noontide meal, which should be followed by an hour on the sofa or couch; and if sleep can then be secured all the better. After that a wash, a little of something to eat, and then another walk, drive, or ride. By such means the assimilative processes are encouraged and aided. A good supply of oxygen removing waste matters is often very serviceable. I have known very judicious treatment of anæmia fail to attain the desired and wonted results on account of a badly ventilated bedroom; removal to a more desirable bedchamber being at once followed by improvement in the patient's condition, and satisfactory progress made.

Another point is to keep the bowels open. Of old physicians were very careful to combine chalybeates with laxatives; the latter aiding in the absorption of the iron, they held. And certainly, experience upholds this view; while at the same time to keep the bowels open is to get rid of certain offensive matters formed in or by the lower bowel, which when re-absorbed into the system exercise a malign and pernicious influence upon sanguification. With loaded bowels assimilation is ever imperfect. There must be no constipation, else the treatment of anæmia is thwarted. The food should

be of a character to keep the bowels open. Oatmeal porridge, dishes prepared from maize, vegetables, fruit, fresh and stewed, and meat, and meat broths, or soups. These should all be given according to appetite and palate and body-wants.

There is a difference betwixt anæmia and convalescence from acute disease. The latter is a case of quickly down quickly up again very often. In anæmia there is more chronicity, a slower failure of the powers and a slower recovery. A person regaining flesh and blood, and with them, strength after anæmia, has not the recuperative powers of a previously healthy and robust adult laid prostrate by the stroke of acute disease. The appetite is not so keen, the digestive powers are not so vigorous. The regimen appropriate for the one will not fit the other. Circumstances alter cases. Certainly! And light food of readily digestible character should in each case precede the solid meals which are appropriate later on, while it is almost needless to say all body-outgoings should be reduced to a minimum.

CHAPTER XX.

FOOD IN CONSTIPATION AND DIARRHŒA.

In disorders of the alimentary canal the choice of food is scarcely less important than in affections of the stomach itself. The food is often alone sufficient to produce or relieve the two opposite conditions of constipation and diarrhœa. The tendency of rice and wheaten flour is to bind the bowels; that of oatmeal to open them. Where the ordinary white wheaten bread locks up the bowels it is found in many cases that relief is at once afforded by resorting to unbolted, or "whole meal" bread, *i.e.*, bread containing the whole of the constituents of wheat, the bran as well as the corn. Oatmeal and maize have the reputation of opening the bowels, and seem to deserve it. Whether this action is due to the fat these two forms of farina contain, or not, may not be affirmed.

Then fruit is regarded as a laxative, and for many adults as well as children, a fig, two or three prunes, or some stewed apples are enough to correct the bowels when correction is required. This laxative effect of fruit must not be confounded with the purgative consequences of a surfeit of unripe, or overripe fruit. Here diarrhœa is Nature's process for getting rid of an offending mass in the alimentary canal, and is a salutary process. On the other hand, under certain circumstances, fruit is a corrective of a loose state of the bowels. In one case known to me, a bilious diarrhœa is set up in summer, which is corrected by eating a quantity of fruit. It would seem that by introducing a quantity of vegetable matter to mix with the bile, the compound is more tolerable to the bowel than the concentrated biliary matter. At any time a quantity of apples (peel and all) will put a stop to this biliary diarrhœa. This use of fruit is almost unknown, but it is worth bearing in mind. The hypothesis here put forward as an explanation of the fact is ingenious, but can scarcely be said to be established. A certain bulk of food is acceptable to the stomach, and the bark of trees is eaten at other times than those of famine, *i.e.*, when only concentrated, food is available. When hay has been washed overboard in sloops carrying live cattle, it has been found that wood shavings added to the corn

were readily taken, and that the animals so fed, did better than those who got no shavings. A certain amount of woody fibre in their food seemed essential to their health. ("Fruits and Farinaceæ.")

Conflicting views are held about the dietary of constipation. Some writers advise avoiding food which will load the bowels as vegetable parenchyma, while others again discountenance such food. That the bran of wheat is good there is no doubt. But if the hypothesis put forward to account for this, *i.e.*, that the mechanical irritation of the bran-scales excites the vermicular action of the bowels, is true and well founded, then it would seem the bran, or much of it is not digested. Certain it is that the coarser the flour and the more bran it contains the better it is, as has been the experience of sundry mariners. And the custom in Westphalia of eating bread made from unbolted flour has been introduced into England (Liebig) with advantage to the bread-eater. The addition of treacle (which is largely levulose, or uncrystallisable sugar) to brown bread is credited with increasing its aperient effect: and "brown bread and treacle" is in vogue amongst the students of the impecunious class whose sedentary habits clog the acting of their bowels.

It may be said as a broad rule, that flesh meat, and meat infusions have a distinct tendency to keep the bowels open; while milk and farinaceous matters tend to constipation. Cheese has a reputation of its own in this respect; while eggs, especially if hard boiled, also bind the bowels.

As to the peculiarities of individuals they cannot be discussed here. One person is potently affected by a small quantity of food which in the bulk of human beings has a purely negative action. For such persons abstention from the articles which disagree with them is all that can be advised.

Thus some persons are readily acted upon by fruit, especially fresh fruit, whenever they indulge in it; while nearly all are affected by rhubarb when first eaten in spring.

Under certain circumstances foods which ordinarily tend to lock up the bowels, set up active purgation. Thus milk, ordinarily binding, when the stomach is acid so as to set up excessively firm curdling, starts a sharp diarrhœa; a natural eliminant process to get rid of the peccant matter. In the same way, other like matters act. Once, at the Leeds Dispensary, a woman brought a child ill with diarrhœa. On being asked what she had given, she replied—"Hard boiled eggs," and seemed to feel herself decidedly ill-treated by

Providence in that the child was the worse, and not the better for her treatment. Such crude, imperfect reasoning obtains more largely than some, who really know something of food and feeding, might think possible; only they do not come into contact with it.

Still more important is the food, where the opposite condition of diarrhœa is established. One broad rule may be laid down, and it is this:—"So long as animal broths are permitted, so long will diarrhœa be intractable." Again and again has this been driven like a spike into my memory. Of course, I have learned the lesson for myself; but in my position as a consultant, it comes under my notice in cases treated by others. There is anything but a general recognition of this fact; and few of our clinical residents at Victoria Park Hospital have not this lesson to learn. Milk with farinaceous matters, forms the food in diarrhœal conditions. Arrowroot, (raw) is the food cure for diarrhœa among children, in the opinion of British mothers. Starch certainly soothes the alimentary canal, and a sago, or even better, a tapioca pudding, forms soft wadding for a bowel with an irritable mucous membrane. All hard, irritant matter is objectionable, and aggravates the condition. A diarrhœa is commonly set up by such matters as imperfectly masticated pieces of hard potato, or of carrot, of a green stalk, or a piece of uncooked celery; or of an unripe apple; and is certainly aggravated by such mechanical irritants. Milk boiled with rice (best ground) has a distinct corrective action. Milk with biscuit powder is excellent. By such admixture, too firm curdling is avoided. To put in a little cinnamon cassia is to add a flavouring agent which at the same time is a good addition as acting favourably on loose bowels. In India the fruit of the Bael or Bengal quince (Agle Marmalos) is in great repute for the treatment of diarrhœa. At the same time, it is used in constipation. "It is an incomprehensible remedy, has neither aroma nor taste, and certainly no astringency." (Christison.) Still, it bears a good reputation.

All vegetable and fruit juices containing tannin, are astringent. The acorn and the chestnut, when dried and ground, provide a meal which has distinctly astringent properties. A gruel can be made from them, or an infusion. (Eichelkaffee.)

In acute diarrhœa the best food is milk with ground rice, or wheaten flour (with cinnamon) in small quantities at once, neither too cold nor too warm. Milk-puddings made with sago, arrowroot, or tapioca, are good. Or, powdered arrowroot (as arrowroot biscuit) in milk. If such food be persisted with, many a diarrhœa will yield

without calling in the aid of strictly medicinal agents. But frequently these last are indispensable.

In more chronic conditions of looseness of the bowels, milk and farinaceous foods are still to be made the staple of the dietary. Stiff puddings, as suet dumpling and plum puddings, are held to be constipating, and the same is said of pastry; but if such is really the case, certainly neither are suitable for conditions of intestinal irritability, whether catarrhal or otherwise. In chronic conditions of diarrhœal character, some objection lies against animal broths and meat infusions; and it is well to give them, or soups with sago, biscuit-powder or vermicelli.

Creeled rice is a very good food in such conditions; and the juice of cranberries is useful, as there is some astringent (tannic) in cranberries. The juice of the pomegranate is also pleasant and good in any looseness of the bowels.

Then come the astringent wines, rich in tannin — as Claret, Carlowitz and Catawba. These may be drank undiluted; or may be made into a nutrient food by adding them to solutions of grape or cane sugar, or even to lactated foods. In many cases the small amount of alcohol is desirable.

It may be laid down as a rule, that farinaceous matter is useful in diarrhœa; the soft starch being not only non-irritant, but actually soothing to the morbid mucous membrane of the bowel.

No doubt in many cases of diarrhœa, acute or chronic—just as in constipation—the resort to medicinal agents is often necessary. But, granting this and admitting the numerous remedies in our possession for the relief of both conditions, still, their action can be potently aided or thwarted by a suitable dietetic regimen. Indeed, in the milder cases, regulation of the dietary is sufficient to keep the bowels in a satisfactory condition.

In the diarrhœa which belongs to travelling, it is well to take a full dose of rhubarb—which first opens the bowels, and then locks them up as a secondary action—the day before travelling; and after this to take milk and farinaceous matters only till the journey is over.

(In consequence of this secondary binding action of rhubarb, an artificial constipation is far from uncommon. By substituting some other aperient for the rhubarb for a time, the bowels commonly come to move naturally and of themselves. Rhubarb is indeed of all aperients that least fitted for habitual use.)

CHAPTER XXI.

FOOD IN PHTHISIS.

WASTING disease is consumption, which may or may not be pulmonary. Of old this was spoken of as a "wearing" *i.e.*, a wearing out, or exhaustion of the bodily powers with emaciation. When a person was spoken of as "being in a consumption," it meant that he or she was emaciating; but did not involve any special cause for the wasting. Dr. C. B. Williams holds that phthisis is the usual malady with persons who die "broken-hearted." Now the term is almost entirely restricted to pulmonary phthisis, or "phthisick." This primitive conception of "consumption" or "a decline," is well worth bearing in mind in relation to phthisis; which at the present day is too exclusively regarded as a mere local malady of the lung.*

In reality pulmonary phthisis is—as a rule—but a local expression of a general widespread and constitutional condition; and this it is which must be kept well in sight in all treatment, preventive or curative. The very fact that it runs in certain families while others are equally exempt from it, is a most suggestive fact. We find it linked with disease of the glands and serous membranes. In childhood we find the hidden taint shewing itself in disease of the mesenteric glands, "pot-belly," or *Tabes Mesenterica;* and in tubercular meningitis, otherwise acute hydrocephalus. As years advance we find the tendency to disease in these areas give way to strumous enlargement of the glands of the neck, and disease in the lungs. Scrofulosis and tuberculosis are as nearly related as twins, and do not merely have the same parentage. In the present day when our attention has been so strongly drawn to the lowly organisms which are found with pulmonary phthisis we are apt to lose sight of its constitutional relations—its morbid kith and kin. That the caseating masses of consolidated lung-tissues form a convenient home for the bacilli of tubercle no one will deny; but opinions may honestly differ as to whether the bacilli are the cause, or the result. Whether we choose to put it thus—"certain families present a low

* There can be no question that the introduction of physical examination of the chest has narrowed our view of phthisis.

resistive power to the tubercle bacilli inspired by all;" or to state it thus—"Certain families manifest a tendency to lung-changes in which the tubercle bacilli find a favourable nidus;" we must confront the fact that there is a something in some families which renders its members liable to become phthisical, which is not present in other families. Taking a broad view of phthisis, it can be honestly affirmed that the families which exhibit this tendency to tuberculosis are those in whom the strumous diathesis is existent. It is the "lowly ethnic form," which carries with it the tendency to tissue-degradation, which gives us our phthisical families.

Laennec laid it down that tubercle was a neoplasm—a new growth of tissue—unknown in the healthy organism; and when it was found the case was hopeless. To such dismal view has succeeded another and truer one, viz. that there is nothing in tubercle—no histological element—not found under other circumstances. Tubercle is a rapid proliferation of connective-tissue corpuscles—the lowly basement-membrane, or packing material of the body—the more rapid and excessive the production, the more huddled together the cells, the more liable is the mass to die. The sparser the production and the nearer the new growth to normal tissue the better its chance of survival.

This pathological disquisition is not the pursuit of a side-issue of the question, but an essential matter which the reader must firmly grasp if he, or she, is to have a correct and vigorous hold of the dietetic management of phthisis. When the cell growth is rapid and extensive, the crowding of the individual cells upon each other means death to them. It is like crowding a host of individuals upon a limited area so closely that it is impossible to feed them; those in the centre die first from starvation. Rokitanski speaks of this "central softening" and of "the ocular proof that the softening commences at the point most remote from surrounding textures" in tubercle. Such softening or caseation of the mass is accompanied by hectic fever which may, or may not exhaust the powers; and wear the patient out in a shorter, or longer time according to circumstances. If the softened mass can be expectorated a cavity remains, which may include the whole morbid area,—leaving the individual short of so much lung, but otherwise little the worse. At other times the expectoration of the softened tubercle is accompanied, or followed by a new development of tubercular growth doomed to soften and die; and the long continuance of the hectic fever exhausts the powers.

But the course run is not always so gloomy. The tubercular growth may not be so free and the cells do not crowd upon one another so fiercely, and so some nutrition of the new growth may be possible; in which case death does not follow. "Vascularity, in truth, belongs as little to the nature of tubercle as organisation itself" (Rokitanski). But if enough of nutrition can be afforded to the mass of lowly texture it may maintain life, and wither up. In some cases only a mass of lime salts (like a piece of mortar) remains to tell of the by-past tubercle; which may stay in *situ*, or be expectorated long after all evidences of lung mischief have passed away. Such is the history of tubercle. But what does the eminent pathologist tell us?—"The cure of tubercle may take place in various ways. Each of the metamorphoses of tubercle may become invested with the character of a healing process. Still, neither the decadence of tubercle, nor its ejection through the medium of ulceration, as local healing processes, are fraught with any value for the individual, unless accompanied by the extinction of the fundamental tubercle—producing crasis." This is the great matter to attain—if possible. Opinions differ as to when the term "tubercular" can be applied to the mischief in the lung. Some hold it may be used when consolidation of the lung is on foot; and in certain cases this is so, as when lung consolidation is found in a person of tubercular family history who has been wasting for some time and had night sweats. Others hold that a mere consolidation of the lungs is not enough, and that it is only when there is evidence of softening on foot therein that the term "tuberculous" can be truly applied. In the language of Niemeyer "we have no hesitation in stating that the greatest danger for the majority of consumptives is *that they are apt to become tuberculous.*"

He says too—"Prophylaxis against consumption requires in the first place, that when an individual shows signs of defective nutrition and a delicate constitution, especially if he have given positive evidence of unusual delicacy with a tendency to diseases which result in caseous products, *he should be placed if possible, under influences calculated to invigorate the constitution, and to extinguish such morbid tendency.*"

The prophylactic treatment of tubercular affections of all kinds is to prevent, or remove that dyscrasis, or general condition of the body and its tissues which gives the tendency to new growths of degraded connective tissue corpuscles—too lowly, too little vascular, or organised to live. There is a general consensus of opinion that

the inherited constitution is a great matter. Evil surroundings and the mode of life tell on the parent-organisms, and what is acquired by the parent becomes inherited by the child. Lugol said the population of Paris of his day was eaten up by scrofulosis, yet their ancestors three or four generations back were healthy people from the country. Dr. Walshe, and still more recently James Cantlie have pointed out the degeneracy of the populations of large towns. Vogel says "Children bring no existing tubercles into the world with them," though "there is no disease so positively inheritable as tuberculosis." Granting this he goes on to say—"The following are generally considered the external causations of tuberculosis; bad air, confinement in close, imperfectly ventilated, dusty rooms, damp houses and bad food—by which living exclusively on rye bread and potatoes, and the deprivation of animal food, is understood."

With the other matters than bad food we cannot deal here; but with it we can deal to some purpose. If the tendency be a matter of inheritance let the physical links betwixt parent and offspring be severed as soon as may be. The mother should give place to a healthy wet nurse (chosen on lines and principles laid down before). In households where this cannot be accomplished artificial feeding must be wholly or partly carried out. In the matter of struma insistence was laid upon the necessity for fat for the formation of sound healthy tissue. Phthisis is an outcome of the strumous habit; and to improve the strumous habit is to reduce the risk of phthisis.

Fat is requisite for the building of healthy tissue-elements. Milk gives that form of fat which is most desirable, viz.:—the emulsion. Fat in milk exists in a very fine emulsion, the fat-globule being very minute. Milk is most acceptable to all young creatures, and is usually taken by them freely. The dietary should be so arranged as to include a quantity of fat-bearing milk. To this may be added some predigested starch if needful. But as soon as the infant can chew, and has some organs of mastication it becomes a question how far it is not good policy to give it some food on which it can exercise its jaws. A biscuit, or cracker, or piece of bread munched would lead to thirst calling for a draught of milk. Such starchy matter well chewed would develop the jaws and their accessories. Too much soft food, whether of insoluble, or of predigested starch, leaves out of sight the natural means of developing the salivary glands. The gnawing which a child delights in is started by the irritation set up by the teeth coming through the gum. During the whole time of the growth of the primary or milk teeth this irritation

exists and serves an useful purpose. To relieve it, the child gnaws something, an ivory or india-rubber ring, or pad; the saliva which runs down its bib telling of the activity of the salivary glands during active movement of the jaws. If the infant could be taught to gnaw a piece of bread or biscuit, it would be well. No doubt pancreatic digestion is active in early life, and salivary action comes into operation with mastication. Animals which chew their cud are not safe from tuberculosis (to which oxen are certainly subject). But the exercise of the jaws is good for the development of the organs of insalivation; and the diastase which the saliva contains acts upon the starch. Children who gnaw at a crust are doing a good thing for the development of their jaws, and with that their permanent teeth; and also bringing out their salivary glands. And upon this salivary digestion their life or death may turn some future day. Surplus sugar is stored as fat; where starch digestion is defective emaciation sets in.

The soft food so much given to children may be in many cases a matter unavoidable; but in our desire to feed the child in the present, do not let us prejudice its future. The encouragement of the salivary glands becomes then of importance in the dietetics of children who have a tubercular family history.

Then there is another point to be attended to, and it is this, viz.: —the absence of fat in malted preparations or baked flours. Admirable as Mellin's food is as an addition to milk, it can not (despite the advertisement) take the place of milk. It lacks the essential factor—fat. The same objection does not lie against lactated foods, where milk enters into the composition of the food, or where the yolks of eggs are used. The bread should be buttered, or some fat used. Some lusty fellows have been raised on a dietary consisting of nothing more than a lump of bread and some dripping, or a bit of bacon. The bread should be cut thin and the butter well rubbed in for delicate children. Where the usual fatty foods are not readily taken then of course resort to cod liver oil becomes unavoidable. The scanty rations of many a little mite are eked out by the cod liver oil from the hospital or the dispensary. I remember a case in point. Some employées at Leeds, went out on strike against their employers, and had to "clem" (starve) in consequence. One tiny, emaciated child was suckled by its mother who only herself had a little weak tea and dry bread. Every article of furniture that could posssibly be spared, had gone to the "house of the three golden balls." Some cod liver oil and steel wine three times a day, did

wonders for that little starveling. It is not uncommon in the North of England to see a child fed on pap for its meals with a little bag to suck or chew betwixt meals, containing butter and sugar, called a "sugar-pap." This is a capital plan when milk cannot be obtained, and supplies an excellent form of fat. The utility of ordinary toffee, as an admixture of carbo-hydrates with hydro-carbons possessing a high nutritive value, has been pointed out before.

Such then are the various modes of introducing fat into the youthful organism. There remains the inunction of fat to fall back upon.

Then most authorities advocate a supply of good vegetables for children—not in lieu of, but,—in addition to other food. These supply phosphate of soda and other useful salts. The same end might be met by animal food, if it were not for the fact that in children of strumous or tubercular constitution, they are given to the formation of uric acid in larger quantities. Potash, a uric acid solvent, is advocated by all authorities on tuberculosis or scrofulosis.* Phosphates must be supplied freely to children of this diathesis, as they readily escape by the urine; and, of course, if voided in the urine, are not available for the tissues where they are so needed. Well-cooked vegetables should be allowed—and form part of the dietary. For the supply of other salts, as the citrate-malate, or tartrate of potash, for instance, fruit in various forms should not be forbidden; indeed, the eating of it should be distinctly encouraged.

A healthy child can extract what its system needs from very unpromising materials; but not the child which comes into the world with an impaired physique. It may not bring with it into the world ready-formed tubercles; but it brings with it the tendency to their formation. And with a thorough knowledge of this fact, we must do our best to combat the inborn tendency.

The milk of the Alderney cow is best. Then that of the black-polled Angus breed; but the milk of any healthy, properly fed cow

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* There is a curious and interesting point about the formation of uric acid by children of strumous or tubercular family history. Professor Laycock pointed out that the skeleton of the strumous is of lowly ethnic form. I have elsewhere pointed out how the formation of uric acid by a mammalian liver is a case of reversion, or turning back of the liver to the form of nitrogenised waste found in the birds and reptiles who have a solid urine. The mammalia have a fluid urine, largely composed of the soluble urea. We see then, in the strumous, osseous degradation as well as hepatic degradation; both of which must be borne in mind in their dietetic regimen.

will do. Mixed with the various farinaceous matters as a milk pudding, milk should be a staple of the dietary. Butter should be freely supplied. Bread and butter pudding is good. Butter can be added to milk puddings at the table with advantage. Fat-eating must be encouraged; and suet puddings are good. The baked beans and pork of New England form a capital food, rich in fat. Potatoes should be well buttered; and for a change, some milk warmed with a knob of butter melted in it, could be served at table with plain boiled potatoes. Pastry made of French puff-paste may be allowed (when it does not cause indigestion), in reasonable quantities. Where the appetite is capricious, even chocolate creams have a value. Sweets may be essential; but so far as possible the eating of sweets betwixt meals should be avoided. It may be necessary to eke out small meals by sweets; but a watchful and even suspicious eye should be kept on the practice in order to avoid the error of spoiling the appetite for meals by sweets. Indeed it is only in rare cases that the plan of "any food rather than none," is necessitated; and it only should be adopted when no better alternative can be devised. Of course toffee (containing butter) is the best form of sweet; and I know at least one comely damsel who owes her life to toffee in the early years of puberty.

In some of the Northern parts of the U.S.A. a cure for phthisis in vogue is to go lumbering where plenty of exercise in the open air, —the sharp chill air of winter,—gives an appetite for fat pork. Such a plan is only suited for phthisical patients with large and capable frames. The principle is sound, and the practice may be imitated in a less severe and gentler form, by many young persons threatened by phthisis. Plenty of exercise in the open air, with hominy and pork for victuals, would save many a life; especially amongst that wretched town-population doomed to live in small ill-ventilated apartments, where the air is foul and laden with mechanical irritants; who form a large proportion of the phthisical patients which crowd the waiting rooms of all hospitals for diseases of the chest.

And now a few words about the use of cod liver oil. As pointed out before, fish-oil is not the most desirable, or the best form of fat; but it has the advantage of being the most digestible. It should be taken after food; and in order not to needlessly provoke the stomach, the interval should be about an hour if possible; so that it can mix with the food passing out of the stomach into the duodenum, where the digestion of fat begins. As pointed out before, the digestion of fat does not commence until the food has left the stomach; conse-

quently if given before, the oil only swims about the stomach, offending it, and causing spasmodic contractions, or excitations. Whenever the stomach resents its presence, it is well to administer the oil at a distinct interval after meals. In other cases it is convenient to take it immediately after food (as in the case of working-people going to their work), and if it does not disagree it may be taken then.

After ten years' experience at the City of London Hospital for Diseases of the Chest, and my other experience at the West London Hospital, and at the Leeds Public Dispensary, to say nothing of over twenty years of private practice, in the thirty years which have elapsed since I was bound apprentice (as an apothecary) to my father, who was in general practice in Westmoreland, I may say that in encountering phthisis my greatest dread is a distaste for fat. Where the nutrition is good, the prognosis is, as a rule, favourable; even if a large area of lung is implicated. While on the other hand, in those cases where there is slowly progressing emaciation with a distaste for fat, the prognosis is as dark as Erebus, even before any lung complications set in; which commonly enough is not till an advanced stage is reached. Whatever may have been the teaching of the experience of others, that is the lesson my experience has taught me. When a patient is steadily wasting with a tainted family history, and a personal history of a loathing of fat intensified of late, then the forecast of the future of that patient presents no difficulty; it is, indeed, only too easy to tell what it will be. The practical outcome of this is the insistence of fat—in some form—being taken without waiting for lung-mischief to show itself. That lock which opportunity carries in front of it (being bald behind) must be energetically grasped; and to be forewarned is to be forearmed. If the patient can be induced to take fat for the tissues, all may yet be well. The absence of fat (somehow or other) leads to a dyscrasis which favours the production of tubercular growths. Even when tubercle has developed and softened, cod-liver oil has snatched many a patient from the grave—yawning before him, or her. If fat can be taken in sufficient quantities, healthy tissue can be built up around the diseased area, and the ravages of the invader arrested. Where the absence of fat leads to a depraved tissue-growth and repair for a considerable time, then a condition of much danger exists. Prof. Laycock called this—"the pretubercular stage of phthisis." Any tubercular growth then formed will certainly start on a downward progress in the least possible time. The impaired tissues

around it offer little resistance, and the necrosing tubercular mass works in no time the ruin of the organism already sapped and undermined.

In all families where there exists a tubercular tendency the children ought to be taught (almost as a religious duty) to eat fat in all, some, or any form as the case may be. To my mind that is the most effective insurance against phthisis that can be adopted. It is unwise and short-sighted to let the enemy be upon one, if it can be foreseen. In some cases where cod-liver oil cannot be taken, mutton suet chopped fine and boiled in milk secures the desired end. This plan is in great favour in London, but exists everywhere.

Probably the most digestible fat next to cod-liver oil is the liquid fat of fried bacon. This rarely upsets the stomach. Bread crumbled into the fat enables it to be readily taken. Others like fat bacon boiled, and sandwiches made therewith.

So much for the feeding of the potentially phthisical, and what forms of food ought to be taken by them. Now something may be said of the feeding of the sick consumptive, where the appetite is feeble and capricious, and the digestive power weak. Some beef tea with Ridge's food, or like food, a glass of milk with some Mellin's or other like food in it; or some malt extract with an aerated water; a yolk of an egg in a little sherry; or a biscuit with a cupful of (ordinary) beef tea, or chicken broth; all are suitable as interludes betwixt meals—the more serious gastronomic performances. The meals should be small, so as not to "outface" the appetite (to use a provincialism), and just enough sent up at once to make the patient think a very little more could have been eaten. Then it should be served with the utmost cleanliness and scrupulous neatness and daintiness, so necessary to secure appetite. Further, the patient is never to be asked what food must be prepared—a nurse who can do that is not fit for the position,—but just something nice made and sent up so as to secure that agreeable surprise which whets the fastidious appetite. A small bird on toast, a few sandwiches, small, thin, and neat in appearance. One kidney, or one length of sausage. An egg with some fairy slices of bread and butter. A small cup of good coffee and cream, or chocolate or cocoa; or even tea with cream. All served on a clean cloth by a pair of hands clean as well as willing, will induce the patient to eat; when under other circumstances the face is averted with a look of disgust on its features, and appetite has turned its back and fled. Such a meal as described might form breakfast.

In many cases it might well and fittingly be preceded by some milk with a little sugar and a small quantity of rum, or brandy (and a suspicion of nutmeg) in it, about 7 A.M. Once this "rum and milk" was a far-famed and sovereign remedy for consumption. And there is no doubt that with many persons such "break-fast" is good, as breaking the long fast of the night, after which the ordinary breakfast can be enjoyed; where without such preparation the stomach would feel itself unequal to a hearty meal. Put in scientific phraseology this furnishes to the stomach the matters requisite to the formation of the gastric juice—known as "Peptogens."

At 11 A.M. might come one of the little interludes just spoken of.

For lunch a cupful of white soup, or vermicelli soup, with a digestive biscuit and a small sweetbread, or a small fish as a sardine, or anchovy on toast. A glass of good red wine would not be out of place. Then a rest on the couch would not come amiss. At 4 P.M., a cupful of chicken broth with plain biscuit broken into it, or some milk with Mellin's food might be taken. Dinner at 6 P.M. may consist of a whiting or some flat fish, followed by a chicken or some game, a little bread and butter pudding and, if fancied, a little cream cheese or a nip of other cheese. A glass of good port, Bucellas, or Madeira, or Marsala (according to the purse) may be taken. At bedtime some treacle posset (milk made hot with treacle and some ginger) may be taken on getting into bed; and the rest be put in a jug with a lid (under a big tea-cosey) for the small hours of the morning. Such would form a liberal dietary during the hectic of softening tubercle; and as soon as the fever abates, some cod-liver oil may be added.

The food when the patient is confined to bed should never be allowed to remain in the room one moment more than can be avoided. Perhaps grapes are the only exception to this. Being covered with a stout impervious skin, the sweet flesh is kept from taint. Only just as much food should be taken into the room at once as the patient is likely to consume—and no more! The contrast to this is a weak, wasted patient with a wan, worn face, and a hand almost transparent, languidly looking at a table on which stands a cup half-full of milk; a saucer with some canned apricots in it; half an apple with a cut surface going brown; a glass with some half melted ice floating in water with a metal spoon in it—helping to melt the ice; half a glass of port, which has been there an hour or more;—and trying to fix the resolution as to which of the group he will try. No wonder the appetite is languid, and that choice is diffi-

cult, and that commonly enough the attempt ends in taking nothing.

The physician may be doing all that lies in his power with medicines, may arrest the night sweats, control the fever, keep the bowels regular, and the stomach in good condition; but without the aid of a nurse naturally gifted and carefully trained, who understands feeding as well as nursing, the results are unsatisfactory. But the physician must exercise a general supervision, and have a word of praise for the good nurse, and a word of another kind for the incapable or careless nurse; and for this he too must possess information.

When those times of gastric irritability come—as come they will and do in most cases of chronic phthisis—then the feeding becomes a cardinal matter. Small quantities of liquid food at frequent intervals are essential. After some study of these intercurrent attacks of gastric irritability the conclusion arrived at is this,—the more extreme and rigid the dietary the more quickly the stomach recovers its tone. On a very strict dietary this may be achieved in from twenty-four to seventy hours; whereas on a moderately careful regimen only it may be a week or ten days before the gastric disturbance is overcome.

A small nutritive enema of treacle and warm water (half and half) or a syrup of milk-sugar or grape-sugar may be given thrice daily, to help to maintain the general nutrition. Or the body may be rubbed with oil—as a makeshift.

With modern knowledge of digestion and body-requirements, with a more perfect grip of the essential wants of the phthisical—of the importance of arresting all outgoings, as well as that of the introduction of food at once digestible and nutritive, the prospects of the phthisical are much brighter than they were at the beginning of the present century. A suspicion that there is a difference betwixt merely getting food down into the stomach and its digestion, is abroad; and that a tablespoonful of milk and Mellin's food which is digested, is really better for the patient than a beef-steak which simply passes through the alimentary canal. To supply to the much-tried organism that which it really requires is to give the most efficient help to it. Fat for prevention; fat for cure! But when there is gastric irritability on foot, it is a case of milk and "baby-foods." Bullock's blood and raw meat, and the other nastinesses offered to the consumptive—and which the love of life induces them to swallow—have no advantage over the liquid foods, of which so much has been said in this treatise.

All along the line, whether during the periods of comparative health, or times of acute peril, with patients with a phthisical tendency, the great cardinal matter is the nutrition of the organism. To build up healthy tissue is our aim; and for that, fat is essential. And usually, fat is loathed and avoided. Imperfect nutrition is what we have to contend with, and the side from which danger is ever threatening, more or less seriously. Cod-liver oil, oil emulsions, preparations like Cremor Hordeatus, and Oleobyne, all strengthen our hands, as regards the permanent treatment of the phthisical. In those periods of gastric disturbance to which such patients are liable, prepared foods are invaluable. "The subjects of pulmonary phthisis resemble in one respect, hand-fed infants. Like them, they are liable to repeated attacks of gastro-intestinal catarrh, which gives rise to indigestion and flatulence. These attacks, by the influence they exercise upon general nutrition, may produce very serious consequences." So says Dr. Eustace Smith, in the article on Chronic Pulmonary Phthisis, in his classical Treatise on the Diseases of Children; and his experience at the Chest Hospital, Victoria Park, agrees with my own, that intercurrent attacks of disturbance of the alimentary canal, and with them, failure of the nutrition, are among the most serious complications we have to encounter in the treatment of Consumption. And this is even more true of children and very young adults than of older phthisical patients; but even with senile phthisis, the difficulty of maintaining the nutrition is the great stumbling-block in their treatment.

CHAPTER XXII.

FOOD IN CHRONIC HEART AND LUNG DISEASE.

Some critical reader may feel surprise, or be inclined to scoff at the distinction made herein. Is not Phthisis a lung-disease? he may ask. Certainly pulmonary complications are very common with phthisis, and frequently form the main trouble and the cause of death; but all the same, but admitting this, pulmonary phthisis has no right to be classed as lung-disease—in the proper sense at least. That would be misleading. Pulmonary Phthisis is not a primary lung disease, as chronic Bronchitis and Emphysema certainly are. Pleuritic disease may certainly exist in a person with phthisical tendencies, and then a condition resembling *phthisis pulmonalis*, with the same indications for treatment, may be set up. But what is meant by the above heading are cardiac affections and morbid state of the lung, which interfere with the flow of blood through the pulmonic circulation; and the obstruction, working backwards, produces congestion of the portal circulation, and the viscera connected therewith.

(Acute pleurisy or pneumonia requires the dietetic management laid down in the Chapter on "Food in Acute Disease:" while a condition of pleuritic effusion, or empyema, would rather be better met by the lines laid down in the present chapter.)

What is dealt with here is a condition which may broadly be said to be the opposite of (or antagonistic to) phthisis. Both cardiac (valvular) disease and chronic bronchitis and emphysema are incompatible with tubercle. Tubercular disease of the lung may, and does sometimes co-exist with valvular disease of the heart, or with emphysema; but so very rarely that the very fact has been called in question. Both Rokitanski and the late Dr. Peacock held that vascular engorgement of the lung, which follows upon mischief at the mitral valve, was incompatible with tubercle. While it has been proposed to set up artificially a condition of emphysema as a prophylactic measure in threatened pulmonary phthisis—only nobody knew how it was to be done.

The point to be well borne in mind in connection with valvular disease of the heart and disease of the lung is the impediment

offered to the flow of blood through the pulmonic circulation, and the effect of this upon the blood-current and blood-vessels behind the obstruction. A certain damming of the current is the result, and with that, congestion of the liver (impeding and impairing its functional activity), and behind that again congestion of the portal vein and its venules. The effect of this venous fulness is felt in the stomach and intestines; and feeble digestion and sluggish bowels are the consequence. The condition of the mucous membrane is favourable to the production of gas, giving flatulence. Flatulence is one of the greatest troubles of persons with a crippled heart or chronic lung-disease. The pressure of the elastic gas prevents the descent of the diaphragm and so further embarrasses the breathing. So pronounced may the difficulty of breathing, so set up, become, that the term "asthma" is applied to it by the sufferer. The disengagement of gas in valvular disease of the heart is sometimes so great that it pours up the œsophagus producing loud noises, and continuing for some time. The term "heart-wind" is applied to this explosion of noisy eructations.

Another consequence of this venous fulness is that the patient feels "full" even when the stomach does not contain food. It is necessary to go over this pathological ground as a preliminary to the discussion of the food appropriate thereto for the instruction of the non-medical reader, in order that he may the better grasp what is here said.

From the venous congestion of the whole abdominal viscera impairment of function follows. The stomach is enfeebled, and primary digestion is lowered, while the working of the liver is embarrassed, and much of the proteid matter which reaches it is never carried forward as the albumen of the *liquor sanguinis* for the nutrition of the tissues, but proceeds on a downward career toward uric acid and urea. The condition of the urine, more or less laden with lithates, tells of the faulty assimilation. It is impossible to feed these persons up by giving them large quantities of animal food; this simply adds to the liver embarrassment. The amiable intention merely links a condition of lithiasis to the pre-existing trouble. It is well to bear this in mind in feeding persons with chronic disease of the lungs and heart. The more severely ill the less the assimilative capacity, and the soluble carbo-hydrates, all but independent of the digestive act, form almost the only food that can be absorbed.

When fairly well persons, with old-standing valvular disease of

the heart, or with chronic bronchitis and emphysema, or indeed emphysema alone, can share the family meal, perhaps they find out that certain foods disagree with them and eschew pork and veal (and some even pigeons), being sensible and rational individuals; but beyond this it is not necessary for them to go. They prefer highly seasoned dishes, as the carminative pepper is good for their flatulence. Mustard too they patronise, and they like a good deal of ginger with their melon. Chutnee they find suits them; and they always welcome mulligatawny soup, and sniff with an air of satisfaction when a curry appears on the scene. Fish *au gratin* suits them, especially when well seasoned. Cauliflower and vegetable marrow *au gratin* can be treated in the same manner and be on intimate terms with the pepper castor. All soups and made dishes to which seasoning can be added are in vogue with them, and all kinds and varieties can be made for them. Potatoes can be served up with a light boiled egg, and peppered to taste. Fresh meat minced, and seasoned with a wall of mashed potatoes, would form a fitting dish. Minced collops would not come amiss; while a Scotchman would doubtless advocate a haggis, or a sheep's-head pie —which can hardly be over peppered. Entrees of all kinds could be prepared to meet their requirements. An Irish stew, or pepper pot, or hotch-potch, would not be rejected by such persons if well-seasoned. Probably they will prefer pepper and butter with a baked apple rather than sugar. Pig's feet or tripe could be prepared to their mind. A fat little pig's cheek cut in pieces and served up hot with a sauce piquant would form an excellent dish, especially where there is any gouty complication—a very common occurrence. They would probably be more likely to pay their attention to ginger snaps, coriander cookies, than to cranberry tarts, or huckleberry cake, or jumbles. Muffins and "mother's crullers" they would be likely to pass untouched, but their eyes might rove to a ginger-bread loaf. Chocolate cake and marble cake would not excite their enthusiasm. With milk puddings they would probably prefer a certain amount of ginger or nutmeg, and cloves could be utilised whenever the opportunity occurred. Cinnamon is good in a rice pudding, and mulled claret is a comfortable drink in cold weather. Stewed celery admits of a good deal of pepper, and mulligatawny vegetables are good for flatulent persons. Mushrooms can be cooked in many ways and readily lend themselves to the cook's art as to condiments. Fish puddings and paste could be specially seasoned. Salads and mayonnaise would probably at their hands be treated to some addi-

tional pepper. Potted fish should be specially prepared, for added pepper cannot always take the place of seasoning put in at the proper time, as in meat puddings and pies for instance. Their whitebait must be devilled, and their prawns be served as a curry. Not that their stomachs are to be made a perpetual spice-mart, but their wants as well as their palates must be consulted.

The three things to be aimed at are, readiness of digestion, a proper proportion of carminatives, and a suitable bulk,—the latter being a matter entirely under the control of the individual. Small meals at no long interval should be the practice; and a light supper is essential to a good night. A substantial supper is very liable to be followed by an attack of difficulty of breathing in the night, and is a matter of certainty with many persons suffering from disease of the heart.

As to the amount of alcohol such persons should take, the answer is a difficult one. King Chambers says of alcohol in disease of the heart—"Let the alcoholic drink be limited to that quantity which increases the appetite. In a great many instances this quantity may be very shortly written down—0." No doubt this is quite true of some persons, especially those persons to whom alcohol is a poison, no matter what is the matter with them, whether it is their heart or their liver. Some generous wine will very commonly be found to agree well with persons with old-standing heart or lung mischief, and will help them at meals. In attacks of dyspnœa some alcohol as a stimulant is of incalculable value. As cordials alcoholic compounds are excellent. *Alcohol de Menthe* has done me excellent service.

When the condition is marked and the patient gravely ill, then a dietary of liquid food is necessitated and meat infusions, predigested starch, and milk, become imperatively called for. King Chambers also points out that with some persons who have dilated hearts a "sloppy diet" does not always agree. Certainly there are persons who can not get on with liquid food, but they are the exception and not the rule. The observation is the outcome of the writer's extensive knowledge on the subject of dietetics, which makes him more observant of the exception than the rule.

When a very advanced condition is reached then the admixture of alcohol with the food becomes imperative. Milk with some brandy; a little beef-tea, or "invalid's soup," also with some brandy, not forgetting to add some soluble carbo-hydrates. One caution again must be observed, and that is not to push the alcohol when

symptoms of acute gastric disturbance appear. Sometimes it is a very difficult choice to make in deciding what is best for the patient's good, when to risk the withdrawal of alcohol, and when to remember the irritable condition of the stomach. The introduction of soluble carbo-hydrates into common use is helping to settle the question. While it was a case of choice betwixt food that required digestion, and the alcohol which passed readily into the blood and was burnt in the organism, then the alcohol had the preference. But now, when so many preparations of soluble carbo-hydrates are at hand, it becomes possible to limit the amount of alcohol to the requirements of the system as to stimulant, other readily combustible hydro-carbonaceous matter being substituted for it as a food.

And this is a matter of cardinal importance when conditions threatening exhaustion are present. As for instance, when some fresh acute bronchitis is added to old-standing bronchitis and emphysema, or is super-imposed upon a condition of advanced mitral disease with permanent congestion of the pulmonic circulation. It has seemed to me that when the capillaries of the lung (which are normally of comparatively large calibre) have for long been distended by a block at the mitral ostium, they readily give way, or yield when some new force is in action. Hepatisation of the lungs is very apt to spread and extend where there is old-standing mitral disease, and then a condition of acute danger is developed, requiring the most watchful care, and calling not only for appropriate medicinal measures but for skilful measures of feeding. The system and with the general condition the digestive organs are in no condition to meet any demand upon them for assimilative purposes. Small quantities of readily assimilable food must be supplied to support the sorely taxed organism. As to the assimilation of fat, it is very doubtful how far it is possible at all in these conditions. A glance at the urine, high-coloured and laden with lithates, tells that the liver is in no condition to deal with large quantities of albuminoids, even if the stomach could digest them. Then the palate has to be considered; fat is loathed, and predigested albuminoids are not enjoyed. How then, and upon what is the patient to feed? The needful grape-sugar must be supplied to it, else the organism will burn out like a fire imperfectly supplied with fuel. There are no doubt medical men to be found who regard with indifference the matter of food and its digestibility, and who order "slops" with but very little discrimination as to what these shall consist of; but these are, as a rule, men who have not deeply considered the sub-

ject of digestion and its processes. The advanced physiological knowledge of the present day is demonstrating what it is the body requires when in straits, and how to supply its wants in a form calling for the minimum of the digestive act. They remind me of those persons who could not see the advantages of George Stephenson's invention of the locomotive; and only held a railroad to be inimical to the coaching interest and the breeding of horses. These persons will inevitably become rarer and rarer, as man is mortal—any "rarity is the precursor of extinction" as we know—to make way for younger men more intimate with the facts of physiology.

CHAPTER XXIII.

FOOD IN BRIGHT'S DISEASE.

ONCE more a certain amount of pathological consideration must precede the subject proper, this being especially necessary for non-medical readers.

"Bright's disease" is a disease of the kidneys, it is commonly taught; and its evidence is to be found in an albuminous urine. This is about as accurate as to say that the Iberian peninsula is Europe, and the Ebro the chief river of Europe. "Bright's disease" of the tubular nephritis, or large white kidney type, and amyloid or lardaceous kidney variety, may fairly be spoken of as "kidney" diseases. But of the granular, cirrhotic, contracted, red, gouty kidney—by far the most common form of Bright's disease, it is impossible to speak as a mere localised "kidney" disease. It is a matter of widespread change, in which the circulatory system has a marked share, and in which the kidneys are also involved. The condition is one of waste-laden blood; where the blood is surcharged with nitrogenised waste. There is imperfect action of the liver, which fails to convert the albuminous matters into serum albumen (for the nutrition of the tissues) and urea (the soluble form of nitrogenised waste). Instead of the latter there is a distinct tendency to form uric acid, the primitive form of nitrogenised waste. Mammalian livers normally form soluble urea; but when the viscus developes a tendency, or rather and more correctly, reverts or falls back to uric acid formation, then the kidneys suffer secondarily. Professor Geo. Johnson, F.R.S., put it happily in his well-known work on Diseases of the Kidneys—"*renal degeneration is a consequence of long-continued elimination of products of faulty digestion through the kidneys.*" As albuminoid matters as proteids cannot enter the blood, this faulty digestion does not lie in the alimentary canal. Soluble peptones alone enter the portal vein; and the "faulty digestion," we now know, lies with the liver. The starting-point of Bright's disease, then, may be said to be—liver incapacity. How far naturally inefficient kidneys, or kidneys injured by disease, as scarlet fever, by their inadequacy to get rid of uric acid and

urates, help to the condition of the blood, and to accumulation therein of excrementitious matter, is a subject on which opinions may differ. How far the first departure from health is mental worry or overstrain—which notoriously affects the liver and the assimilative organs injuriously—we do not yet know. Clifford Allbutt regards Bright's disease as having frequently such a mental origin.

When these mal-products are formed, and exist in excess in the blood, two things may happen:—

1. The kidneys may become injured by the output of these lithates; or

2. The excrementitious matters are retained in the blood, giving rise to lithiasis,—or gout in its widest sense.

Frequently and not uncommonly more or less of both is found. Certainly, gouty persons have gouty kidneys. But a well-marked condition of Bright's disease may exist which all physicians would class as Bright's disease, and not as gout. In such cases there is generally a certain pallor, (such is the Bright's disease seen so much in Germany) while a gouty aspect is more common in England.

In this widespread change the urine may or may not be albuminous; or only albuminous at times; or it may not be albuminous (Mahomed). Many hold that in this chronic granular condition of the kidney albuminuria is not essential to the diagnosis, and that, when certain other changes are notable, the absence of albumen from the urine carries with it no comfort. By the overwhelming importance attached to one symptom and the neglect of the other semeia, a great deal of error, confusion, and misapprehension,—aye, and it is to be feared much unnecessary mental discomfort,—have been occasioned. Surely there is enough unhappiness in the world without adding to its mass unnecessarily. Albuminuria, too, has other associations than Bright's disease.

Such then is Bright's disease as ordinarily encountered.

I am old enough to remember when the teaching was—meet the drain of albumen by liberal quantities of albuminoid food. This, it is needless to say, was an outcome of imperfect acquaintance with the nature of the malady, and a superficial conclusion. It stood on the same chronological platform as the advocacy of the flesh of carnivorous animals for diabetes. It was at that time thought that the great matter was to keep the albumen from passing out of the body; and, when this could be successfully done, to introduce plenteous supplies of it.

Now a great change has come over our views. The teaching of

Geo. Johnson has had a profound influence upon the present generation, and the most recent works on the subject hold most strongly the view of nitrogenised waste in the blood being the cause of Bright's disease. Prout did good work and so did Garrod. And the younger men of this generation are all familiar with the relation of chronic Bright's disease to the albuminoid elements of our food. Probably, too, they are all, more or less, of the opinion that in many cases a mental factor plays a prominent part in the starting up of the morbid condition. In other cases the starting point is excessive indulgence in animal food, *i.e.*, beyond the body-needs. When there exists evidence of renal inadequacy, then it becomes necessary to limit the work thrown upon the kidneys. What amount of evidence would be accepted as conclusive, and what as merely suspicious, but not proven, is a matter upon which opinions may, and most probably would differ; and I am by no means inclined to step out of my way here to attempt to settle the point. If any doubt exists, it will be well to err on the side of caution.

In the first place, then, it is well to restrict the amount of lean meat consumed. The flesh of the larger animals, beef, mutton, pork, no matter whether as adults or juveniles, must be taken in strict moderation; and with due regard to the needs of the body and its tissues, and not to the cravings of the palate—nor yet the stomach, which leans to meat. The joint is best avoided, unless it be the fat of it. Made dishes are often permissible, and entrèes can be made which gratify the palate without taxing the liver. Liver and bacon, for instance, is a suitable dish, though some would take exception to the albuminoid element in the liver. Stews, with plenty of vegetable matter and fat, are preferable to joints. It is clear that legumes, which are rich in nitrogen, should not be a large constituent of the stews. Hashes with plenty of vegetable matter, as turnips, carrots, celery, onions, leeks, and with a limited amount of lean meat, are good and palatable. A vegetable entrèe should form one course at dinner. Provided the digestion be good, pastry is not contra-indicated. Cakes, crackers, biscuits, sweet corn, are all permissible. Salads should form a distinct element in the dietary; and fruit, raw or cooked, may be taken by those with whom it agrees.

Certainly there are some cases of Bright's disease where there is pronounced anæmia, to which the above dietary is not applicable, and where a more distinct animal flesh dietary is indicated. But to the bulk of persons with Bright's disease, where the nutrition is good, these remarks apply.

Fish in all forms, all kinds and however cooked, are admissible. But here again we must remember that fish is albuminous, and that unlimited fish even may be harmful. Shell fish and molluscs form an agreeable change.

Soups of all kinds may be taken, a preference being given to those where the amount of "stock" is small. Those prepared with cream, and those thickened with farinaceous matters, are to be preferred. Soups can be made thick with vegetable matters, and such soups are good.

Persons with Bright's disease will do well to learn to eat fat. They should put cream (as understood in England) in their tea and coffee, eat plenty of butter on their bread, should be given to biscuits and butter at lunch and dinner; should have real melted butter to their fish; and should not be niggardly with the oil in their salads. A basin of porridge, either of oatmeal or hominy, followed by a rasher of fat bacon, or fish with melted butter, would form a suitable breakfast. Soup, as described above; some well-mashed potato or fish, followed by a vegetable entrèe, with biscuits and butter, would form a desirable lunch. Then dinner might consist of soup, fish, an entrèe, pudding of any kind not too rich in eggs, milk-puddings, blancmange, pastry, or creams are permissible when they can be procured; again, biscuits or crackers and butter, with a nip of a savoury cheese to finish with. Dessert might be liberal—though I am afraid some of the older practitioners will not approve of this indulgence. Then if some food were required later on, a plain biscuit and a glass of milk, or of wine, would be sufficient.

Of course much would depend upon the features of each case. As has been pointed out before in these pages—and may possibly even be referred to again—it is not what is consumed, but what is digested, that is the measure of nutrition. It may be found that even where some meat would seem indicated by the anæmia it does not attain the desired end. I have at the present time a patient at the Victoria Park Hospital, who has other evidence of Bright's disease than mere albuminuria, in whom this is well seen. She is a well-built, strong woman, but pale. So sure as she eats any animal food, so certain is she to put in an appearance, complaining of not being well, looking ill, and with a quantity of albumen in her water; while she restricts herself to farinaceous food, vegetables, fish and milk, she is well. Again and again she is tempted by some foolish, well-meaning person to take some meat, and, being a good-natured obliging woman, again and again has suffered for her compliance.

Indeed I have found with a certain class of victims to Bright's disease that a milk and farinaceous dietary (supplemented by warm baths) has not only cleared the urine of albumen, but has made the sick persons feel better.

Still there may occur cases where from special circumstances the dietary may be relaxed with advantage, but the liberality should be strictly watched. And if there be continuous mental strain this should be put in abeyance. Then a modified dietary may be excusable; and indeed of advantage to the individual. Then as to the use of alcohol in Bright's disease, opinions differ. Some twelve years ago the matter of the part played by alcohol in the production of Bright's disease was hotly discussed, some very eminent authorities taking sides. Of course it may be laid down as a general proposition that alcohol has a bad effect upon the liver (no one will deny that), and that therefore when the working of the liver is impaired alcohol is contra-indicated. But then sometimes a little alcohol has a beneficial effect upon the system generally, and it may be questioned how far it can be wisely withheld, especially if no obvious evil result from its use. Any albuminuric can find out for himself—if he cares to make the experiment—that a certain amount of alcohol will send up the proportion of albumen in the urine: though probably few will be tempted to test the accuracy of the statement in their own persons. Each person who is the subject of Bright's disease must study the matter for himself or herself. I am not of opinion that it is well to make a hard and fast rule to the effect that under no circumstances should alcohol be taken by a person with chronic renal mischief. This would be unwise. But as a broad rule, it may be said that when genuine Bright's disease is on foot it is well to keep a strict watch over the amount of alcohol taken, just as it is kept over the amount of animal food consumed. The malady is found among water-drinkers, and therefore has not necessarily an alcoholic origin. All the same, alcoholic indulgence will aggravate the state of matters when it exists; and there are few persons who take much alcohol who do not, in the end, have mischief in their kidneys.

Without negativing other casual relations, it may be said that the dietetic and drinking habits of the individual commonly play an important part in the production of chronic Bright's disease.

With some persons a milk dietary is efficient in furnishing relief to the symptoms, and the removal of albumen from the urine. Milk cures and grape cures are in vogue on the Continent of Europe.

To remove the albumen is not, however, to restore the kidneys to a normal condition. Nevertheless, it is quite possible to stay the progress of the kidney mischief, and to arrest its march by wise and judicious measures, of which a careful, regulated dietary is a factor of cardinal importance. And in some cases it is possible to make the advance so slow as not to be measurable.

CHAPTER XXIV.

FOOD IN ALBUMINURIA.

In putting albuminuria into a chapter by itself my design is to emphasize the fact that it and Bright's disease are not synonymous or convertible terms.

Albuminuria is commonly enough really the escape of peptones by the kidneys. Instead of being converted, or turned back into proteids in the portal vein, a quantity of peptones find their way into the general circulation and slip out of it by the kidneys,—just as readily and as easily as they found their way into it by the portal venules. In such case the system is ill fed, and the individual is pallid; and a condition closely simulating true Bright's disease is set up. Such, indeed, usually are the cases of Bright's disease which are "cured;" for the real disease (as spoken of in the last chapter) does not admit of cure. Conditions of acute "Bright's disease" are, however, compatible with recovery; leaving the kidneys either free from permanent injury, or in a more or less disabled condition. Thus the consequences of scarlatinal nephritis are most varied. Even more permanent states are compatible with considerable length of days. But with conditions where the presence of albumen in the kidneys is not accompanied by co-existing evidences of perturbed health, the prospect is far less grave.

The following is an illustrated case in point: A patrician youth, who like many others of his class indulged a good appetite, had albumen persistently present in his urine. A hasty medical opinion to the effect that he had "Bright's disease" was accepted by his family; and in so far he was an object of interest to a large circle of friends. One day, when riding in a London park, he met with an accident, and, breaking a limb, was taken to a neighbouring hospital. There he was put upon the ordinary dietary, with the result that he lost his albuminuria. The case was greatly discussed in polite circles as a "wonderful cure of Bright's disease." This is an instance of the loose, inaccurate gossip that goes on about diseases all over the world.

When a diet is too rich in albuminoid matter the urine is apt to

be albuminous. When such albuminuria exists, it is but reasonable to suppose that some modification of the dietary is desirable. First, however, ascertain what the precise facts are, and if the dietary is really too rich in albuminoids. If this be so, it is well to reduce the amount, and put the patient upon farinaceous matters, fish, fruit and fat. The whole matter was too thoroughly gone over in the last chapter to need repetition here.

If, on the other hand, there is evidence of mal-nutrition present, it may be well to combine a liberal dietary with a course of tonic and hæmatics.

Mere albuminuria, as differentiated from Bright's disease, is not a bodily trouble which calls for special dietetic treatment, beyond what has just been said above. If too much labour in the digestion of albuminoids has been thrown upon the digestive organs, then we may find the nitrogenised matters slipping away in some form of albumen, just as they may be cast out as some imperfectly oxidised form of urinary product.

Indeed the whole treatment of a case of albuminuria, alike medicinal and dietetic, will turn upon the diagnosis; and for accuracy greater pains are desirable than are usually bestowed upon it, too commonly the worst being rashly assumed.

CHAPTER XXV.

THE FOOD IN DIABETES.

If the dietetic indications in mere albuminuria are comparatively unimportant, the case is widely different in diabetes mellitus, where they are of the gravest importance.

In diabetes the patient wastes because the grape-sugar, the food of the body, is slipping away by the kidneys and so is unavailable for the body-needs. It is not the presence of the sugar in the urine which is of importance, though it would seem like it from the attitude of a considerable section of the medical profession. The patient is not ill because sugar is present in the urine, but because his body is starving, and he is tortured by the symptoms set up by the presence of an excess of grape-sugar in his blood. An urgent thirst impels him to drink copiously to wash this excess out of his system. There is some prospect of success in dealing with a salt-thirst by drinking; but with a sugar-thirst the case is widely different, as anyone who has had experience of it well knows. The distention of the vascular system adds to the blood-pressure in the hepatic arteries, and so increases the output of sugar from that viscus. The suffering patient drinks and drinks, and grows worse and worse too frequently; and unless some impression can be made upon the functional disturbance in the liver, the case goes on from bad to worse until the final end. In other cases the progress is less disastrous, and by proper dietetic arrangements the patient keeps the malady at bay and lives on,—a harassed and much-tried creature. In other cases a better career is found, the "diabetic storm" passes over, leaving a comparative calm behind; where there is more or less sugar in the urine continuously, but rarely any symptoms of diabetes. In such cases any disturbance, as a shock, or an access of worry, may bring on an acute diabetic attack. Such are then the varieties of what may fairly be termed "Diabetes" as compared to mere "Glycosuria."

It is well to bear the distinction in mind when dealing with any individual case where sugar is present in the urine.

In the management of diabetes proper the dietary is a matter of

cardinal importance. By indulgence in any food which will form grape-sugar, or rather from which grape-sugar can be formed, a distinct aggravation of the symptoms is at once set up. All carbo-hydrates must be carefully avoided. The consequence is that a rigid dietary must be laid down by the medical man, and observed by the patient. Indeed the latter is only too glad to secure relief from the torturing thirst endured. The dietary preserves the organism from perishing of exhaustion until the disturbance which sets up the diabetes is abated, if abatement be feasible. By supplying food material which does not form grape sugar, two distinct ends are served—

1. The organism is fed; also

2. The suffering caused by the presence of sugar in excess in the blood is relieved.

These are great matters, truly. But the question may be raised:—Does a strict dietary exercise any curative effect over the malady? Does it merely keep the patient alive till a cure is wrought? Or does it tend directly to that end?

If we believe in "physiological rest" to any organ impaired or injured, or functionally incompetent—and such a broad rule is recognised in medicine—then the non-carbo-hydrate dietary has a distinct curative tendency. Physiological rest as regards its glycogenic function must favour the regaining of its lost or weakened power by the liver. It is at least a reasonable assumption, even if it cannot be demonstrated as a proved fact. Such assumption falls in with one's experience on other matters medical.

Where carbo-hydrates are contra-indicated, then we find the dietary restricted to hydro-carbons and albuminoid with the alcohols, as ordinary alcohol or spirits of wine and the alcohol glycerine.

The chemist has striven to give directions to the baker in this matter, and by depriving wheaten flour of its starch, a gluten bread is made which can be eaten with butter. Gluten bread is not particularly acceptable to the palate, still with salt butter it is not very objectionable. Some gluten biscuits are the most unpalatable food I have ever tasted in a wide range of experience. Nothing but a monstrous fear of death, or some tremendously strong motive to live, could enable any one to get them down.

Then the oil of the almond is utilised as formed in almond flour, and still more in almond biscuits. These are palatable enough, and form pleasant eating.

Apropos of almond biscuits, a certain little matter may be related

which throws a strong light on the genesis of diabetes. Talking one day with Mr. Van Abbott, who is so well known in connection with almond food for diabetes, I asked casually—"Who are your chief customers, Mr. Van Abbott?" His face assumed an earnest look as he replied, gravely—"Grey, worn, business men looking older than their years."* The almond biscuit is rich in oil and therefore forms an admirable "fuel-food."

Then of course bulk is grateful to the stomach and must be sought in the parenchyma of vegetables.

Before proceeding to the practical discussion of the food of the diabetic, it may be well to give Dr. Pavy's table of the various foods:

Dietary for the Diabetic.

MAY EAT

Butchers' meat of all kinds, except liver, ham, bacon, or other smoked salted, or cured meats. Poultry, game, shell-fish and fish of all kinds, fresh, salted or cured. Animal soups not thickened, beef tea and broths. The almond, bran or gluten substitute for ordinary bread. Eggs dressed in any way, cheese, cream cheese, butter, cream. Greens, spinach, turnip-tops, French beans,* Brussels sprouts,* turnips,* cauliflower,* broccoli,* cabbage,* asparagus,* sea-kale,* vegetable-marrow,* mushrooms.

(Those marked with an asterisk may only be eaten in moderate quantity, and should be boiled in a large quantity of water).

Water-cress, mustard and cress, cucumber, lettuce, endive, radishes, celery, vinegar, oil, pickles. Jelly flavoured, but not sweetened, savoury jelly, blancmange made with cream and not milk, custards made without sugar. Nuts of any description, except chestnuts. Olives.

MUST AVOID EATING

Sugar in any form. Wheaten bread and ordinary biscuits of all kinds. Rice, arrowroot, sago, tapioca, maccaroni, vermicelli, potatoes, carrots, parsnips, beet-root, peas, Spanish onions.

Pastry and puddings of all kinds. Fruits of all kinds, fresh and preserved.

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* Of the association betwixt persistent mental strain and gradually increasing diabetes we are beginning to have some formed opinions, such as already exist betwixt some sudden shock and the quick development of acute diabetic symptoms.

MAY DRINK

Tea, coffee, cocoa from nibs. Dry sherry, claret, dry Sauterne, Burgundy, Chablis, hock, brandy and spirits that have not been sweetened, soda water. Burton bitter ale in moderate quantity.

MUST AVOID DRINKING

Milk, except sparingly. Sweet ales—mild and old—porter and stout, cider, all sweet wines, sparkling wines, Port wine, unless sparingly. Liqueurs.

Such is a fairly complete list of foods forbidden or permissible.

Of course all the predigested carbo-hydrates as prepared foods are contra-indicated. However valuable elsewhere, they must be banned from the diabetic's dietary. On the other hand, all oil emulsions can be cordially accepted.

All fishes preserved in oil form admirable food.

With Dr. Pavy's material to hand, it is possible to construct the different meals of the day, it not being necessary to have all the articles mentioned upon the table at once. A variety, of course, must be provided.

BREAKFAST.

Tea, coffee or cocoa with cream, gluten bread and butter, almond biscuits, fish, with oil or melted butter, caviare, mutton-chop, rasher of bacon, cold meat, ham, game, pressed beef, tongue, watercress, salad, pickles.

LUNCH.

Soup, lobster salad, potted trout, celery, raw or cooked, radishes, scrambled eggs, cream cheese. Claret, hock or sherry.

DINNER.

Salmon, with lobster sauce, brill, anchovy sauce, cod, shrimp sauce, herrings, sauce tartar, plain white fish and melted butter, trout with parsley butter (not flour paste), stewed mushrooms. pigs' feet. A joint of any kind with spinach, cabbage, cauliflower, Brussels sprouts, broccoli, celery, endive or cucumber.

Entrèes.—Sweetbreads, pigs' or calves' cheek boiled, then cut in pieces and served up with a sauce piquant. Mayonnaise. Game of all kinds.

Salad and cheese, cream cheese, pickles. Creams (unsweetened).

Gluten bread, butter and cheese, almond biscuits, claret, hock,

Chablis, Capri, Carlowitz, Catauba, red Australian wines. Whiskey or brandy, with any aërated water.

By such means, variety—so essential to the palate—can be secured, and an ample sufficiency for the nutrition of the body, too, is furnished.

And now to some criticisms of the rigid dietary:

In the first place, Dr. Pavy bans liver; yet he allows shell-fish, though the oyster and the mussel consist largely of liver. This is obviously only an oversight.

Then do not turnips contain some sugar? He states they do. That is another oversight.

The more serious criticisms are these:—Is it always desirable to subordinate the dietary to the diabetes? Are not sometimes slight divergences from the rule permissible? Though milk does contain sugar, is it always advantageous to bar it? Of course when the patient is gravely ill, any addition to the sugar in the blood is offensive and objectionable; but when the condition is less pronounced sometimes milk may be allowed freely, and the same may be said about ordinary bread. In one case lately, where the patient chafed at the rigid dietary, a little bread came in advantageously. The relief it gave to his stomach more than counterbalanced the extra sugar in the system.

But of course such deviations from the rule should be narrowly watched, and with a full consciousness on the patient's part that the change is an experiment which may, or may not, turn out successfully. What the writer desires to put clearly, if he can achieve this, is "That while it is necessary to adopt a rigid dietary in grave cases of diabetes, and when acute symptoms are present, is it necessary or desirable to pursue such dietary when the symptoms are quiescent? Is it, or is it not, the fact that many persons, fairly to be regarded as diabetics, suffer much more from their dietary than their malady, and that many break bounds without apparently suffering in consequence thereof? The histories related by various patients would favour this view in numerous instances. But, all the same, great caution should be exercised, and the effects of each forbidden article be narrowly watched.

The patient must be dieted in order to be kept alive until the liver can regain its lost power as regards its glycogenic function—if possible. But how is this to be attained? It is not merely by the avoidance of sugar and what will make sugar. The plan in vogue some years ago, known as "the skim-milk treatment of diabetes," advocated

vigorously by Dr. Scott Donkin, had a large measure of success; and yet the milk sugar was not removed in the cream. The actual amount of sugar had something to do with the result, I feel certain. A glycosuric patient of mine recently sent me a sample of her urine for examination which was absolutely free from sugar. Yet at that time she was living upon vermicelli pudding and arrowroot—two farinaceous matters most likely to have produced an excess of sugar. There seems some ground for holding the view that the liver can deal normally with a certain amount of sugar, and a certain amount only; and any excess beyond this remains in the blood, giving rise to diabetic symptoms. But the subject is one on which light is coming in slowly, and time must elapse before we can see it in the full day-light of complete knowledge. Some years ago a retired army medical officer of eminence consulted me for severe attacks of angina pectoris, and on examination he was found to have a gouty heart with disease at the aortic valves. On taking down his history it turned out that some years previously he was (in India) testing the urine of a patient for sugar. He was in perfect health and strength, and wishing to be sure of his tests he determined to examine the suspected urine side by side with his own. To his astonishment he found his own urine heavily laden with sugar. So alarmed was he that he made all haste home to put himself under an eminent authority on the subject of diabetes. On this his health soon began to fail in reality, and after some months he grew so weak and ill that he begged for some raspberry jam, as he could not be worse than he was. His request was complied with, and he felt the better of the carbo-hydrate; and the result was he gave up his dietary, ate and drank what he pleased, and got well; ultimately losing his glycosuria entirely. There was no grounds for questioning the truth of his narrative; he was a man of known probity, belonging to a distinguished family. It is a curious fact that several brothers of this family have at times passed sugar. They are all gouty.

In what has just been written it is not intended to cast doubts upon the value of a non-saccharine dietary in diabetes—that would be absurd; but to point out that we have yet much to learn about the conditions under which sugar appears in the urine. Of the value of a suitable dietary, not only as a means of furnishing relief, but as a stepping-stone towards cure in many cases, there can exist no doubt. Indeed in diabetes mellitus we see one of the most marked instances of the value of dietetics, and of the food treatment of disease.

CHAPTER XXVI.

FOOD IN GLYCOSURIA.

The main reason for the existence of this chapter—as a separate chapter rather than as an appendix to the last chapter—is to keep glycosuria well apart from true diabetes. There exists such an unfortunate entanglement of the two, not only out of the medical profession but even within its ranks, that a complete divorce of the two is most desirable.

Glycosuria is quite common with corpulent persons, especially where some gout is present. In such persons, indeed, it seems a species of waste-pipe running off the surplus carbo-hydrates, and without which the body would become embarrassed with an accumulation of fat. Indeed the laying on of fat from the surplus of carbo-hydrates, while a condition of glycosuria is co-existing, is not unknown.

A marked instance of this came under my notice about a year ago, when a series of experiments with prepared foods (consisting mostly of predigested starch), instead of increasing the out-put of sugar, resulted in a marked increase in weight.

What the relations of gout and glycosuria are we do not precisely know. The one is a disturbance of the glycogenic function of the liver, the other of the second function of that important viscus the metabolism of albuminoids. There is some linked association evidently, though what its nature is still shrouded from us.

On the other hand, one of the great dangers connected with the abundance of animal food allowed in cases of diabetes and glycosuria is the production of interstitial nephritis, or Bright's disease. There is no proof that sugar in passing out of the kidneys does any injury to those organs, any more than it does to the portal vein by which it enters the circulation at every meal; but the large amount of albuminoids not only allowed but positively forced upon the glycosuric patient is certainly destructive to the kidneys. This is the other aspect of food, viz.:—seeing that we do not do harm with it. It is not well to engraft a state of permanent injury to the kidneys upon a condition of glycosuria, which, as yet at least, is not con-

victed of evil, even if it have been under some suspicion. That is the substitution of a morbid certainty for what is so far unproven.

There are not only the benefits to be derived from a correct dietary in certain maladies; there is the harm which may accrue from dietetic error. The kidneys are far from being beyond suspicion in gouty persons of middle age, and if a liberal meat dietary be adopted there is a distinct and measurable danger of aggravating the renal trouble—a most undesirable matter. The patient must choose (under medical direction) what he will do, whether he is more afraid of the gout or the glycosuria; and if he is a prudent, thoughtful man he will choose the glycosuria—as the less evil of the two.

If the teaching of this chapter be mainly negative, it is not, therefore without its value.

CHAPTER XXVII.

THE FOOD IN GOUT.

Before proceeding to the subject-matter proper of this chapter, it may be well to clear the ground somewhat as to what is meant by the term, "gout." It once had a definite meaning, and was applied only to the deformities of the small joints of the extremities caused by the deposits of urate of soda in the articular cartilages of these joints. They were produced *goutte per goutte,* that is "drop by drop." So long as our ideas of gout were restricted to these obvious morbid changes all knew what was meant by the term.

But when the chemist discovered that the said deposits, or "chalk stones," consisted of urate of soda, the word began to have an extended meaning. Gout was seen to be a blood-disease, *i.e.*, that uric acid (as urates) circulated in the blood, and wherever the blood circulated there might gout follow. For instance, it was found that gouty deposits were laid down in the valves of the heart just as much as in the joints of the fingers and toes. Urate of soda is commonly formed in nodules on the pinnæ of the ear (Otolites.) Bronchitis has been found often to have a basis of gout. Certain skin diseases were recognised as having gouty associations. Then various disturbances of the action of the heart have been discovered as being outcomes of gout. Thus the range of the term was found to be constantly extending. From uric, otherwise lithic acid, being the *materies morbi* of gout, the terms "lithiasis" and "lithæmia" have been used to designate the gouty condition. They are more accurate terms, but it will take some time for the public to become familiar with them; whereas the vagaries and internal complications of gout are fairly generally known.

The various foods of the body, whether fuel-food or tissue-food, undergo within it an oxidising process which produces heat and force. The fuel-foods burn easily; the tissue-matters oxidise with difficulty. Worn-out tissue and surplus tissue-material undergo retrograde changes which fit them for excretion by the kidneys, and to a less extent by the skin. These changes take place to a great

extent in the liver—the furnace of the body—the resultant products being cast out by the kidneys.

When kidneys first make their appearance in the animal world we find the form of nitrogenised waste to be uric acid. Uric acid, as urates, belong to animals with a three-chambered heart and a solid urine, *i.e.*, birds and reptiles. When the mammalia appear we find a four-chambered heart and a fluid urine; the form of nitrogenised waste being the soluble urea. There still remains, however, traces of the primitive urinary product, uric acid. So long as the liver can convert the waste and spare albuminoids into the soluble urea all is well. As the soluble urea the excrementitious matter is got rid of without difficulty, and albuminoids far in excess of the body-needs can be eaten with impunity. But when the liver fails in the formation of urea, and reverts to or falls back upon the primitive uric acid, a change comes over the scene. The comparatively insoluble uric acid lingers in the blood, finds a habitat in the articulations of the extremities, in the valves of the heart, on the pinnæ of the ear, while it irritates the air passages and teases the skin. A certain proportion finds an exit by the kidneys, and worries these organs into interstitial nephritis, known as the cirrhotic or gouty kidney.

At other times the condition assumes a complexion which entitles it to be designated Chronic Bright's Disease.

When urates are formed by the liver one of two things happens: 1, the urates are cast out by the kidneys, which become injured by this out-put, and chronic kidney disease is set up; or 2, the uric acid remains within the system, giving gout (in some of its many forms); or, as very frequently happens, somewhat of both occurs, as has been said before.

From this we can understand what is meant by "the gouty habit" or "a gouty man" or "latent gout," and realise that the individual is the subject of hepatic reversion, with a tendency to the formation of uric acid. We can also comprehend what is meant by "gouty families," and why Cullen called gout "*Morbus Hereditarius.*" When there has been great indulgence in animal food for generations the liver becomes more or less worn out by its toil, and the scion of such a family starts life with an insufficient liver. "The children of gouty parents ought more especially to follow the hygienic and dietetic laws laid down in these pages ("Nutrition in Health and Disease") if they wish to escape much suffering. As a rule they ought to be water-drinkers throughout life. They have to pay the penalty of their progenitors' excesses or dietetic errors.

If the gouty diathesis is strongly marked, they should be most moderate and abstemious in their food habits, and lead as active and muscular a life as possible." (James Henry Bennett). While, on the other hand, the humbly born alderman who started life with a liver in all its integrity, eats and drinks with impunity into old age before his Nemesis overtakes him; or, perhaps, himself escapes scot-free to leave a tendency to gout along with his wealth to his descendants.

By such consideration of gout (in the widest sense of the word we can all the better understand the food-requirements of persons afflicted with this tendency to form uric acid. What the relations of uric acid are to "blue blood" it is impossible to say definitely, but both run in the veins of long-descended patricians. Gout has had a history of good eating at some time in the history of the individual or his race. The liver has become impaired by the labours it has had imposed upon it for generations. And this liver-failure brings with it in its wake all and sundry of those disagreeable consequences,—the various and numerous forms of gout. It also points out to us in an unmistakable manner the food to be adopted for the relief of this tendency to form an excess of uric acid.

1883.

LONDON FEVER HOSPITAL.

Dietary Tables.

Adults.	Children (*Under Ten Years of Age*).
1.	2.
Milk, 2½ Pints.	Milk, 2½ Pints.
Bread, Eight Ounces.	Bread, Eight Ounces.
3.	4.
Milk, Two Pints and Half.	Milk, Two Pints and Half.
Beef Tea, One Pint.	Beef Tea, One Pint.
Two Eggs.	Two Eggs.
Ice.	Ice.
5.	6.
Fish, Eight Ounces (Uncooked, Fresh Fish).	Fish, Five Ounces (Uncooked, Fresh Fish).
Bread, Twelve Ounces	Bread, Twelve Ounces.
Potatoes, Six Ounces.	Potatoes, Four Ounces.
Milk, Two Pints.	Milk, Two Pints and Half.
Milk Pudding.	Milk Pudding.
Tea, Half Ounce, or Cocoa, ¾ Ounce.	Butter, One Ounce and Half, or Treacle.
Sugar, One Ounce.	One Egg.
Butter, One Ounce and Half.	
One Egg.	

ADULTS.

7.

Meat, Six Ounces (Cooked, and without Bone).
Potatoes, Eight Ounces.
Bread, Twelve Ounces.
Milk, One Pint.
Two Eggs.
Pudding.
Tea, Half Ounce, or Cocoa, ¾ Ounce.
Sugar, One Ounce.
Butter, One Ounce and Half, or Treacle.
Cheese, One Ounce.

CHILDREN (*Under Ten Years of Age*).

8.

Meat, Three Ounces (Cooked, and without Bone).
Potatoes, Eight Ounces.
Bread, Twelve Ounces.
Milk, Two Pints and Half.
One Egg.
Pudding.
Butter, One Ounce and Half, or Treacle.

9.

Fish, Eight Ounces (Uncooked, Fresh Fish).
Bread, Twelve Ounces.
Potatoes, Six Ounces.
Milk, Two Pints.
Milk Pudding.
Tea, Half Ounce, Coffee or Cocoa, ¾ Ounce.
Sugar, One Ounce.
Butter, One Ounce and Half.
Two Eggs.

10.

Fish, Five Ounces (Uncooked, Fresh Fish).
Bread, Twelve Ounces.
Potatoes, Four Ounces.
Milk, Two Pints and Half.
Butter, One Ounce.
Two Eggs.

11.

Fish, Four Ounces (Uncooked, Fresh Fish).
Meat, Eight Ounces (Cooked, and without Bone).
Potatoes, Eight Ounces.
Bread, Twelve Ounces.
Milk, One Pint.
Pudding.
Tea, Half Ounce, Coffee or Cocoa, ¾ Ounce.
Sugar, One Ounce.
Butter, One Ounce and Half.
Two Eggs.

12.

Meat, Four Ounces (Cooked, and without Bone).
Potatoes, Four Ounces.
Bread, Twelve Ounces.
Two Eggs.
Milk, Two Pints and Half.
Pudding.
Butter, One Ounce and Half.

13.

Meat, Six Ounces (Cooked, and without Bone).
Potatoes, Eight Ounces.
Bread, Twelve Ounces.
Milk, One Pint.

ADULTS.

Two Eggs.
Pudding.
Tea, Half Ounce, Coffee or Cocoa, ¾ Ounce.
Sugar, One Ounce.
Butter, Two Ounces, or Treacle.
Cheese, One Ounce.
Beer, One Pint a day, or Beer Money 1/- a week.

DIRECTIONS FOR STEWARD.

Beef Tea.—1 lb. of lean meat without bone to the Pint.
Strong Beef Tea.—2 lbs. of lean meat without bone to the Pint.
Chicken Broth.—One Chicken to each Pint.
One Fowl, 2 lbs. for Three Persons.
Mutton.—Leg and Shoulder (loin and best end of neck, special order).
Beef.—Salt Silverside (other joints, special order).
Rice Pudding.—One Ounce Rice, Quarter Pint Milk, Half Ounce Sugar, One Egg for Three Puddings.
Sago.—Quarter Pint Milk, 1 Ounce Sago, ½ Ounce Sugar, One Egg for Three Puddings.
Custard.—Two Eggs, Half Pint Milk, Half Ounce Sugar.
Bread Pudding.—¾ oz. Sugar, Bread, One Egg for Four Puddings.

When the poison of gout was first discovered to be an acid, a curious instance of careless and slovenly reasoning was furnished to us. That sugar will ferment, and turn into an acid, is a notorious fact. The poison of gout is an acid. Therefore sugar must be eschewed. This illogical conclusion, however, derived a certain *vraisemblance*, or colouring of reality, from the fact that with some gouty persons sugar does turn acid in the stomach, and very quickly too. But because such is the case with certain dyspeptic gouty persons it is not well to lay down a broad rule thereupon applying to all gouty persons. As a rule it may be affirmed that gouty persons are not partial to sweet food, and pass the sweets at dinner with very few exceptions. But all the same, uric acid is not derived from the saccharine elements of our food. The old school who forbade sugar are giving way to younger men, who follow the chemico-physiological changes in the nitrogenised elements of our food.

In the present consideration the gouty dyspeptic will be left out, and will receive appropriate attention when indigestion is dealt with in a later chapter. To include him, or her, would render this chapter more complicated than is desirable.

Then again some persons object to fat for gouty people. On what their objection is based is unknown to me. For my own part my experience, personal and other, runs on all fours with Ebstein's directions to eat fat. Once fat has passed the stomach, all trouble connected with it is apparently over. It is burned readily, nor can the objection lie in the tendency of fat to make fat in the body. For we have every reason to hold that fat does not make fat, and that the fat in the body is derived from the surplusage of carbohydrates.

The food element which furnishes uric acid is, then, the albuminoid, or proteid matters. The flesh of animals is the main source of gout-poison. It is not possible to dogmatise on this matter; but on comparing notes with a number of good observers of extensive experience, I find there is a considerable agreement as to the flesh of the larger animals being gouty. The white meats, as chicken, do not seem to possess the same strong tendency to pass into uric acid as is found with the brown meats. Caseine, whether in its animal or vegetable form, seems very free from this tendency to uric acid formation. Of course what has just been written must be taken for what it is worth—neither for more nor for less. An impression may be fairly correct in the main even if it cannot be represented in figures. A diet of lentils, if rigidly adhered to, is a very valuable matter in cases of confirmed gout. But this fact does not rest solely upon the comparative freedom of caseine from a tendency to uric acid formation: there is another important factor at work. Such food does not tempt the palate to excess; and thus the liver gets that physiological rest—as regards its function in the metabolism of albuminoids—which is so important in the recovery of impaired functional capacity. No doubt many gouty persons would get great relief from their tormentor if they could adhere to a dietary of lentils: but then human endurance fails under such a gastronomic trial. The late Earl of Derby, it is said, once had some sherry sent him, which, it was asserted, "would not make gout." He returned it to the wine merchant, saying, he "preferred the gout." So it is with a dietary of lentils. The Hebrew Patriarchs had flocks and herds, but they lived on milk and lentils and farinaceous matters. Indeed Isaac marked an important family ceremony by first partaking of savoury meat. The Zulus, who possess a most magnificent physique, live on milk and "mealies," or cooked maize.

When we come to the practical details of a gouty person's dietary,

we must keep the cardinal matter of the avoidance of albuminoids well in view.

Soups need not be forbidden, as the amount of gelatine is not very great, and possibly little of it passes out of the alimentary canal. White soups made with cream are good. Vegetable soups are excellent, though a caution may be required about those made from legumes, albeit the albumen is caseine. Fish soups are permissible. All soups may be thickened with broken biscuit, or contain quantities of vegetable matter, as Julienne, hotch-potch, Spring soup, and green-pea soup, asparagus, soup, corn, soup, pea and tomato, turnip and potato soups. Many persons prefer a quantity of onion, and others celery in their soup, both of which are unobjectionable from a food point of view.

As to sauces there is little to be said. Fish forms a large portion of the dietary of the gouty. Fish does not differ from the flesh of animals in chemical constituents so much as in its comparatively small food value. The amount of actual proteid matter in fish is calculated at about one fourth that of animal flesh. The consequence is, a comfortable, satisfying meal of fish does not overload the liver with albuminoid material, as would be the case with an equal bulk of the flesh of warm-blooded animals. The difference lies in the proportion of water, which is very large in the flesh of fish.

Many soups are made from fish. First comes the attractive cray-fish soup, after which follows at a short interval (gastronomic) oyster-soup. Lobster-soup is good. A white soup is prepared from any of the white fishes down to the conger-eel, and notably the haddock, which is admirably adapted to the body needs as well as the palate of the gouty.

Then there are cooked fish, the whiting, the haddock, the cod, the turbot, the brill, the skate, the halibut, the shad, the john-dory, the gurnet, and lesser known fish. The coarser fish are the ling, the hake, the chub, the bream, and of course the pike. The trout, the salmon trout, the sewin of South Wales, the lake trout, the salmon, the grayling, and the white lake trout of the St. Lawrence are all excellent. The mackerel, the herring, the pilchard, the eel are too rich in oil for many stomachs, but otherwise are permissible. These fish may be boiled, or baked or fried, or made up into fish-balls, fish-cakes, etc., with potato; or served up *au gratin*. The smaller flat fishes, the sole, the flounder and the plaice are good, but if fried should be prepared with care; and few things that are eaten are more offensive to a tetchy stomach than a badly fried sole

with the fibres soaked in fat. This is the source of many an attack of acute indigestion, or "even gout at the stomach."

The shell fishes, as the oyster, the clam, the mussel and the scallop, are all excellent. So are the lobster, the cray-fish, the shrimp, the prawn and the crab. Many other shelled fishes, molluscs and segmented fishes, are eaten in different parts of the globe; while the Chinese prize highly the sea-slug. The edible snail has its votaries, but this is not "a fish."

To a gouty man of perfect digestion a lobster-salad is a typical food. Its food-value in nutritive material is not high, while of its acceptability by the palate it is needless to speak. Fish in many forms lends itself easily to curries; and a well-made fish curry with plenty of rice is an excellent dish for a gouty individual.

As to the flesh of animals, the great matter to remember is that this is a very concentrated food, rich in albuminoids and therefore to be eaten sparingly—as regards the lean at least. The question of digestibility is not being considered here, but the different forms in common use may be arranged pretty much as follows, mutton, beef, lamb, veal, pork; the last two being partaken of cautiously. Bacon and ham seem less objectionable. When these concentrated animal foods are eaten they should be in company with a fair store of fat, and a liberal supply of vegetables of all kinds. The rabbit furnishes a capital change, especially when cooked with a quantity of fat pork or bacon.

The same may be said of the flesh of fowls of all kinds, those with white flesh being to be preferred to those with brown meat on their bones. Thus the chicken is better than the duck or goose. Turkey seems to lie midway.

Then, as to game, the same may be said of white and brown meat, whether it be in fur or feathers. A little game to finish off a meal will scarcely be objected to by the most rigorous food-disciplinarian. But again it is a question of bulk, and little must be taken.

Then as to such matters as sweetbreads and other glands; tripe, pig's feet, pig's cheek soused, or as brawn, liver and bacon, they are all permissible in proportion to the bulk of fat, and the small quantity of lean in the dish. Calves' head is not objectionable. Vegetables form a very considerable factor in the dietary of the gouty. Some objection might be taken to mushrooms and other fungi because of their meat-like composition. Vegetables containing a quantity of oxalic acid disagree with many gouty persons, who should of course avoid rhubarb, sorrel, tomatoes, asparagus and even

broad beans. But for ordinary gouty persons potatoes in all forms, carrots, turnips, parsnips, beet, broccoli, Brussels sprouts, cabbage, spinach, endive, lettuce, beans, peas, haricots, green corn, and sugar corn, kale, leeks, onions, salsify, sea-kale, samphire, laver, celery, vine shoots, cucumber, gherkin, vegetable marrow, and other less generally used vegetables, are excellent. Many admit of being variously prepared so as to furnish that desirable matter, viz., variety. Salads should be freely eaten.

Puddings are to be measured by the amount of eggs in each. The egg is rich in albuminoids, and therefore objectionable to the gouty. All milk puddings as rice, tapioca, sago, semolina, corn-flour, malt-preparations, and other farinaceous matter should be prepared without eggs, or at most only the yolk should be used.

Suet dumplings are not to be forbidden, or bread and butter pudding, if the cook will make it without eggs. But custards and omelettes, sweet or savoury, are to be shunned. Pastry is not necessarily to be forbidden, nor yet cakes, if the amount of egg be moderate. All kinds of creams are permissible, but blancmanges, shapes, jellies, lemon sponge, and articles of food containing much gelatine are to be avodied.

Fruits of all and every kind, raw or cooked, are suitable, whatever views may once have been held about sugar. And plenty of dessert fruit is desirable, except for those gouty persons with whom sugar disagrees and turns acid. Indeed lemon juice, lime juice, oranges, shaddocks, and the like sub-acid fruits, are at present rather in vogue with persons with a gouty or rheumatic tendency.

Then, as to cheese and cheese preparations. Even though consisting of caseine, cheese in large quantities is not particularly desirable. Such dishes as toasted cheese, welsh rarebit, cheese soufflée, or ramekins, consisting of cheese and eggs, are undesirable; but maccaroni cheese and cheese straws may be eaten in moderation. For those who hanker after the flavour of cooked cheese a cheese pudding is permissible. Hominy, sago, or rice well boiled in milk and mixed with cheese finely grated, may be put into the oven to brown; and a very good and digestible dish is so furnished. Nor should large quantities of uncooked cheese be eaten, unless it be cream cheese, which contains only a small proportion of caseine. Biscuits, crackers or pulled bread, with butter and a nip of tasty cheese, should form a part of the dinner of the gouty. No one but a glutton would eat too heartily of such cheese as Rochefort, Gorgonzola, Neufchatel, Camembert or Brie.

The small green Swiss cheeses mixed with herbs and grated on bread and butter are unobjectionable. The poorer skim-milk cheeses are contra-indicated.

As to milk itself, it should be taken in moderation, unless it is taken as the sole food—a regimen which agrees with some individuals.

As to dessert, nuts and fruits, fresh or dried, are permissible for those with whom they agree.

And now as to beverages. Few gouty persons get on well with malt liquors. Ales and porters brewed after the English fashion are so much poison to gouty persons of thin flank. Bulky, gouty persons can only indulge their liking for such malt liquors by a compensating abstinence from the flesh of animals. No gouty man can drink malt and eat meat at the same time without paying the penalty for such indiscretion. Beer brewed after the German plan, as lager beer, does not upset the liver to the same extent as English ale; and many gouty and bilious persons can enjoy a draught of lager, whether Bavière, or Milwaukie, without suffering therefrom. In my opinion, indeed, the lager system of brewing will ultimately prevail,—at least among persons who have to be careful as to what they eat and drink.

Wines, too, differ in their qualities. All good generous wines must be given up. Old Port, Madeira, brown Sherry, Tokay, Constantia, Chateau Yquem, Bucellas, all must be abandoned. Port, old in wood, is less pernicious than old bottled port; but most gouty men eschew port wine sooner or later, no matter how fond of it. Champagne, Moselle, Hock, and Burgundy are scarcely less harmful, and I have seen gout simply blaze out in a few hours after Marcobrunner and Rüster.

A poor, thin wine, as the poorest claret, or corresponding Italian, Spanish, or Australian wine (I do not know the wines of the Western Hemisphere and therefore cannot speak of them), is all the vinous drinks a confirmed gouty man can take with impunity. He may still pride himself on his cellar—but it is for his guests, not himself!

A little spirit, brandy or whiskey, Scotch, Irish, Bourbon, Old Rye, or Monongahela, with water, is the best drink beyond doubt. Mineral and aërated waters may be taken freely, and help to wash the uric acid out of the tissues.

When a gouty man's palate fails him, it is rather a fortunate accident. So long as the pleasures of the table are regarded as among the good things of life, so long is the tendency to form uric acid fostered and favoured. An old clergyman was known to say "I've

been a dyspeptic for fifty years. Thank God for it!" The cause of his pious gratitude for what most people regard as a plague, was the fact that his brothers had all perished from gouty affections, while his dyspepsia had prevented him from overworking his liver.

When the liver manifests a return to a reptilian condition, its owner must alter his dietetic and gastronomic performances,—or suffer the consequences.

There is no nice way of having the gout; and, what is worse, there is no pleasant way of avoiding it.

CHAPTER XXVIII.

FOOD IN NEUROSAL AFFECTIONS.

In dealing with affections of the nervous system there is one point which must never be forgotten, and that is the supreme importance of fat. For long the Germans have recognised this fact, especially in reference to the treatment of neuralgia by cod-liver oil.

This matter of the relations of fat to the nervous system receives an increment of interest from the physiological fact that the nervous system is rich in a certain phosphorised fat known as Lecithin with a formula $C_{44}H_{90}NPO_9 \times 3H_2O$. As pointed out before, in the chapter dealing with anæmia, there are only two bodies actually made or (as M. Foster puts it) "manufactured" within the animal organism, and which are not found in the vegetable world.

These are linked with the function of the blood-corpuscles and with the nervous system, two matters with which vegetable life has nothing to do. The one is Hæmoglobin, which enters into the composition of the red blood-corpuscles; and the other is Lecithin, "a conspicuous component" of the brain and nerves. Just as under certain circumstances we find some persons becoming anæmic, and the red blood-corpuscles either are not made, or break down, or may be somewhat of both; so in others we find the nervous energy waning. How far this is due to exhaustion of the store of Lecithin is a matter on which as yet we can only speculate. But the hypothesis that such is the case stands in a curious and suggestive relationship to the clinical facts that fat and phosphorus are so serviceable in the treatment of atonic conditions of the cerebro-spinal system.

In the busy struggle for existence of the present day, when, as Sir J. Crichton Browne has pointed out, "the battle of life is no longer fought with thews and sinews but by the brain," the demands made upon the nervous system are excessive. "The spirit indeed is willing but the flesh is weak." Certainly the spirit is so very willing that the flesh must give way, even when not weak. It is all very well for Clifford Allbutt, F.R.S., to charge his neurotic patients with a lack of endurance. Whatever powers of endurance the body

may possess the restless tenant would exhaust them. The sword will wear out the scabbard! And especially is this true of those small or slightly built persons with well-vaulted foreheads and small viscera—the Arab type of beings of the neurosal diathesis. Their restless energy brings about, sooner or later, a break-down. The assimilative organs cannot supply the nutritive pabulum of the nervous system in sufficient quantity, the store becomes exhausted and then the brain-power gives way; the work that once could be accomplished with ease becomes a grievous task, and a little later on the capacity to discharge it is no longer present. There is a distinct break-down; and the poor patient, bereft of his whilom power, is sent away for rest—to do nothing but recuperate. Such a story is sadly frequent at the present time, and threatens to become even more common in the future. After a long rest and appropriate food the brain is once more equal to its labours.

In such a case the individual has distinctly drawn a bill upon himself—borrowed so much of his intellectual capital; and the day comes when that bill must be met: after which follows a long slow process of paying back into the body-bank till the working capital is once more sufficient for competent action. There has been a body-expenditure in excess of body-income, and so the reserve body-capital has been heavily drawn upon, until indeed it is too small for successful enterprise. By reducing the outgoings to the minimum, and raising the incomings to the maximum, a new balance or capital is regained. It is just like a man who exceeds his income; he gets into debt, and then he has to live on very little until he has cleared off his debts,—and then he can go on again. When the pabulum of the brain is exhausted a long process of recuperation is necessitated.

Having secured for such a patient the requisite rest, and nervine tonics, the next question arises, viz., How is he to be fed? Experience has taught us the fact, before physiological chemistry could tell us the why, that fat and fish are the foods specially indicated. Fish is rich in phosphorus. A phosphorised fat has to be furnished to the nervous system. But to supply in liberal quantities food containing phosphorus and fat, is not necessarily to restore to the impaired assimilative powers the capacity to build up lecithin from the raw materials. It is one thing for the contractor to collect his materials for a house: there are the masons and bricklayers, the carpenters and plasterers, the slaters and glaziers to build up the edifice required for its erection. If these be but few then the work

of construction will proceed but slowly, no matter how much material is to hand. So in the body. If the constructive powers are but feeble, then time is essential to the accumulation of a sufficient store of lecithin for working purposes.*

There are the capacities of the assimilative and constructive powers to be calculated in each case. When they are fairly vigorous comparatively rapid progress is possible; when they are gravely impaired, and still more when the individual has but small viscera, the recuperative process is and must be a slow one. The digestibility of the food must not, then, be lost sight of in the calculation. Small meals of suitable food at short intervals are the line of feeding to be taken. Then fish with butter should form a conspicuous factor in the dietary. Milk puddings are good. As a beverage cream with seltzer water, or other aërated water, is capital. Cold coffee with cream forms an excellent combination. Creams of all kinds are good. Cod-liver oil and oil-emulsions may best agree with others.

The yolk of an egg in a little sherry would make a little change. Salads with oil suggest themselves. Stewed fruit and cream ought to form a staple dish.

When we consider that the pabulum of the nervous system is a phosphorised fat, we can comprehend why the plan of treating cases of cerebral exhaustion by liberal quantities of lean meat has turned out a failure. Albuminoids do not supply the requisite material for the intended purpose; while in their metabolism they furnish matters which may be called hepatic mal-products, or "liver stuffs," which possess very irritant or toxic properties as regards the brain. Consequently a highly nitrogenised dietary is not only without advantage, but actually possesses positive drawbacks. The brain is not fed thereby, but in its weakened condition is annoyed and vexed by these "liver-stuffs."

This matter of the toxic effect of liver-stuffs has another aspect which is well worth consideration. An American patient told me that, after the perusal of my work on "Indigestion and Biliousness," he found that he lost his bilious headaches by striking out of his dietary the flesh of animals except fish. He lives on a milk and farinaceous dietary, with butter, plus the fish. On this restricted regimen he has excellent health, feeling quite well. But any diver-

* What is here written must not be taken as accepted demonstrable fact, but rather as a working hypothesis; not however without its utility.

gence from this dietary brings with it its own punishment. Dr. A. Haig, one of the casualty-physicians at St. Bartholomew's Hospital, has put on record a similar experience of his own, arrived at quite independently. Long ago, when attached to the West London Hospital, a patient came to me whose expression told of habitual suffering. She was tormented by severe and almost ever-present bilious headache. She averred she could only take a little lean meat, dry bread and tea. She was prevailed upon to give up this regimen, not without considerable difficulty, and try farinaceous matter and fat. Much to her surprise she soon was considerably better. Ten years later she turned up accidentally, when it was found that the improvement had been maintained, and her face was free from the "pained" look it bore when first seen. The theory and the clinical facts hang together at any rate, if a more positive expression of opinion is not yet warrantable.

Some persons, and especially women, of highly developed nervous system and small digestive power, are liable to recurrent storms of neuralgia, specially facial neuralgia. Sometimes it is facial neuralgia (as ordinarily understood) at other times there is intense pain in the eyeball with hemicrania.

When the storm is blowing they can be got to take medicine, but food they cannot be induced to take. This is a great mistake. "Pain is the prayer of a nerve for healthy blood" said Romberg; and this exquisite sentence is well worth bearing in mind. The blood must be good in quality and sufficient in quantity, else the nerve gives out its inarticulate cry. One sufferer of this kind came under my notice lately. Milk was objected to and meat infusions alone were available. But such infusions, as pointed out elsewhere, have (practically) no food-value. Some "lactated food" was available, and by the addition of it to the meat-infusions the strength was maintained. Not only did the system derive support from the food to bear the suffering, but the nerve being better fed it sooner ceased its wail. Shortly the opportunity offered itself for this patient to press her new convictions upon a friend suffering in like manner, and with the same satisfactory result. When the pain is on, the sufferer can only object to every proposition, and begs to be left alone. The patient, however, when so suffering, is not a competent judge of what is best to be done, and must be firmly resisted. Both patients suffered severely from a sudden cold spell of weather. The cold air of the night caused them to waken in the morning with

neuralgia. Some food in the small hours of the morning warded off these morning face-aches in a most satisfactory manner.

(The effect of cold air in the production of these face-aches seems as follows: Cold causes the cutaneous vessels to contract, and the cutaneous nerve-fibrils thus have their blood supply cut down, with the consequence of neuralgia in the starved nerve. Protection against cold is, of course, one preventive matter; while a sufficient supply of nutritive blood is another. Our ancestors in draughty houses had bed-curtains and wore night-caps. No doubt this saved many a face-ache. Their descendants, with curtainless beds, and ignorant of night-caps, suffer for their advance in taste. The facial neuralgia which has its origin in a cold drive is a similar case of nerve-starvation.)

This view of the relation of food to neuralgia, and especially superficial neuralgia, is well worth bearing in mind. Such neuralgia belongs to persons with small viscera, and who can only take small quantities of food at once. They cannot endure the long unbroken fast of night, and should have something last thing on getting into bed, and also something first thing in the morning before commencing to dress. In cold weather, beyond this, they must have some food in the small hours of the morning. This may consist of milk with some malted preparation; or of a meat infusion with some predigested food. This may be kept warm under a tea-cosey; or on the hob, if the fire be kept up, or a spirit lamp may be used.

And, by attention to the matter, many neuralgic sufferers will be able, if not to escape their plague altogether, still to avert much of their pain. At times alcohol in some form may be indicated as an addition to the food just mentioned. Sometimes indeed a little alcohol seems necessary to digestion in the small hours of the morning.

Dr. King Chambers describes a curious neurotic condition, linked with an erroneous dietary thus—"There is a peculiar form of *hypochondriasis* which arises from eating too little vegetables and too much meat. It is distinguished by the high specific gravity of the urine (1.025 to 1.035) dependent on the presence of urea alone without sugar. There is in these cases often a remarkable lassitude, and apparent paralysis of the limbs suddenly occurring after exertion. Sometimes there is emaciation. Both these symptoms usually lead the patient and his friends to attribute the morbid state to insufficient nutrition, and to increase more and more the proportion

of meat in spite of the aggravation of the ailment. A rapid cure attends the diminution of the meat meals to one daily, and the supplying their places with plenty of porridge and green vegetables."

There is another piece of evidence, that while the feelings produced by normal digestion are agreeable—hence the practice of charity-dinners—when there is an excess of albuminoids in the dietary, or the liver is unequal to its work, mal-products are formed which possess a toxic effect upon the nervous system.

CHAPTER XIX.

FOOD FOR CHRONIC INVALIDS.

As might, *à priori*, be expected, the dietary of a chronic invalid differs materially from that of persons in robust health. Yet this obvious matter does not always receive the attention it merits, and the invalid has often "to take what is going," and which is adapted to the body-needs of the rest of the family. Of course this does not occur in thoughtful families; but is apt to be the case where one member of a robust family returns to the family group in broken health. It is all very well for a family to enjoy unbroken health; but lack of familiarity with illness carries with it certain drawbacks; and of these, ignorance of what an invalid requires, is one. There is no intention to neglect the sick member, or disregard his or her requirements; it is simply a case of want of knowledge. Whereas, on the other hand, in families where illness is not unknown, an acquaintance with the wants of sick persons is found. This is, in the hour of need, the silver lining to the dark cloud of illness. Few physicians but have had the above facts forced upon their attention from time to time. Called to a sick person, in one household all are ready to lend their services, but the willing volunteers are an ill-drilled mob, destitute of any knowledge of what has to be done, and how it has to be carried out; while in another family the physician finds the different members ready to fall each into his or her place like well-disciplined soldiers. How they have purchased their knowledge it may be well not to inquire; but it is there when it is wanted—and that is something.

With the chronic invalid the position is somewhat different. That one of the females of the household which has the kindest heart, the best head, and the most willing hands, takes upon herself the task of tending the sick member. But no amount of willingness can compensate for the lack of actual information.

No affection for instance can ward off the evil effects of bread crumbs in the bed, which soon become hard, gritty particles readily productive of bed-sores. Ready and affectionate as she is, this devoted woman has her lesson to learn, and probably learns it—as

much other knowledge is acquired—through much error and mistake; but all the same it has its disadvantages. The self-appointed nurse must pore over her cookery-book, and ponder over what she finds there. If some of the details seem uncalled for, some process unnecessary, she will do well not to exercise her right of private judgment and make modifications of her own. It is never well to prophecy about viands. The proof of the pudding is the eating! And it is not well to assume that some cooked product will be toothsome. It may turn out far otherwise. Taste and try. Paul's advice to the Thessalonians to "Prove all things, hold fast that which is good," applies here very pertinently. She should make a private trial of each dish before serving it up to the invalid. She may be puzzled what dishes to select. It will be well for her to give her attention to light rather than solid food. The invalid is not equal to much exertion and therefore does not require the substantial repast which is desirable for the hale members of the family, and which they enjoy. The body-requirements are smaller. On the other hand lack of exercise leaves the appetite impaired, and the zest for food is not so keen. Something tempting is indicated—a small bird on toast, a dainty sandwich, a herring's millet, or a bit of cod's roe, a sweetbread or a little fish, a small quantity of a milk pudding, or a little stewed fruit and cream, or a custard in a glass, something small in amount and tempting in character.

Very often the cook dislikes the trouble of these little "oddments," in which case it is better to try to prepare them independently of her than to persist with her. No woman yet ever made a dish palatable which she prepared unwillingly. A cook must give her mind to her dish—if it has to be a success.

If the volunteer experiences a difficulty in her selection she may find considerable help in a little book "Food for the Invalid, the Convalescent, the Dyspeptic, and the Gouty," published by Macmillan and Co., containing some three hundred culinary preparations selected from various cookery-books and compiled by the writer.

She must learn, too, to prepare small quantities at once. Few foods improve by keeping, and few bear warming up without losing much of their toothsomeness. Sometimes the family meal will include a dish of which the invalid may fancy a little; but as a rule something special must be prepared. The invalid cannot help having but a feeble appetite, or even being dainty. Frequently, no doubt, the invalid bears much quietly without saying anything about it. Perhaps he is peevish. Illness is a trying matter!

As the amount of food which can be taken at once is small, the invalid must not be restricted to the family meals, but have little gastronomic interludes. A cup of milk, a cup of beef-tea with some prepared food in it, a little custard, the yolk of an egg in sherry, or some chocolate, or possibly even some sweets. But here we have to confront a difficulty, viz.: How far do such minor meals destroy the appetite for the regular meals? This must form a matter for private judgment in each individual case.

Sometimes the invalid may like highly seasoned dishes, but as a rule plain fare with condiments in moderation is preferred by sick persons. As Sir Wm. Roberts has pointed out, the taste for savoury food is diminished in sickness, and simple food, unattractive to hale persons, is relished by those who are not well.

In consequence of lack of exercise there is always a tendency towards sluggish action of the bowels; and this can usually be met by a baked apple, a few stewed prunes, or figs occasionally. Especially is this necessary where milk forms a considerable portion of the dietary. Meat-infusions have a tendency the other way. According to the state of the bowels, milk or meat infusions must be resorted to.

Then another matter is the avoidance of fat by invalids. In all illness fat is objectionable to the palate. Whether this is an instinctive avoidance of an article of food which cannot be digested or not, may not be affirmed. But of the impairment of the pancreatic function in acute disturbances there is much proof. This, however, is certain, viz.: that the necessity for such concentrated fuel-food as fat is much diminished in the case of invalids. Confined indoors to a great extent, and incapable of much exertion, there is not the demand for hydro-carbons which is normal in health.

(Of course this statement does not apply to strumous and phthisical persons, who require a certain amount of fat to build up healthy tissue).

Salted and dried meats are rarely relished by invalids unless it be in the case of bacon and ham. Tinned or canned meats must be used at once, else they turn against them. All greasy meats are disliked and dry meat preferred: thus a chicken is in request, while a succulent duckling is rejected. Boiled or baked fish is preferred to fried fish, as a rule. An egg is a favourite food with invalids usually. Plain boiled, or boiled lightly, and turned out into a warm cup containing a little knob of butter melted with some pepper and salt, either are attractive. Or a light boiled egg, turned out upon

some nice mashed potato and mixed therewith, forms a dish very acceptable to the palate of an invalid.

As to drinks and beverages it is impossible to say anything; so much depending upon the likings and dislikings of different persons, and so much upon the actual requirements of each individual case.

Great cleanliness and neatness in the serving of food are essential, otherwise the appetite flees at once. No attractiveness in the viands can compensate for a dirty plate or a soiled cloth.

CHAPTER XXX.

FOOD IN OBESITY.

CONTRARY to what might be expected, fat eaten as food is not deposited in the body as fat. Part of it is utilised in tissue-formation, while the rest is burnt. The fat of the body is the surplusage of carbo-hydrates beyond body-needs. Of course it is obvious that if the dietary be rich in fat this will burn to maintain the body-temperature, and thus the demand upon the carbo-hydrates consumed is lessened, and the more remains over for adipose tissue.

Fat is deposited in the body in an irregular manner; sometimes evenly distributed, at other times certain localities are selected. The eye lies in its orbit with a packing of fat around it. The salmon has its fat in its tissues, the cod locates its fat in its liver. Some persons are fat all over like a fattened animal; while others carry their fat in a thick pad over the wall of the abdomen. The camel, the dromedary and the buffalo have a lump of fat on the back.

The King of Dahomey's wives are fattened on rice and butter, previous to the nuptial ceremony. A certain plumpness is admired in some animals; and a reserve store of fat is often very convenient, carrying with it a certain staying power. A sleek, well-fed horse is an instance in point.

On the other hand fat may be a burden, as many obese persons know full well. It certainly may be so excessive as to be unsightly; and fat persons are regarded as legitimate objects of ridicule by the vulgar. Consequently, many and divers plans have been laid down for the reduction of redundant corpulence.

Lewis Cornaro, who was a corpulent, gouty man, put himself upon a spare dietary, viz., twelve ounces of food, mainly vegetables, and fourteen ounces of light wine daily; and on this lived in good health for over half a century. Few persons, however, could undergo such a severe regimen. Another obese man fed largely upon apples, on which he reduced himself considerably. The great idea in the different plans of treatment is the avoidance of carbo-hydrates in the food so far as is possible.

There are two plans before the public at the present time: (1) Bantingism, and (2) Professor Ebstein's plan.

It will be well to take the plan advocated by Mr. Banting first, because it must be criticised rather than recommended. He cut off carbo-hydrates; no sugar, no starch. So far so good. But on the other hand he allowed unrestricted indulgence in albuminoids, as the flesh of animals for instance. This reduction of a human being to the status of a carnivorous animal has been attended with unfortunate results. All along in this treatise the danger of an excess of albuminoids in the food has been steadily insisted upon. The dangers involved therein have been pointed out, especially in the chapters on "Bright's Disease" and on "Gout." And this danger of kidney injury is no myth or imaginary risk. Not long ago a very illustrative case came under my notice. A man of sixty, whose kidneys were probably not above suspicion, was advised to reduce his corpulence, he then being in good health and feeling well. It was well to take off a couple of stones, his medical man said, and Mr. Banting's plan of reduction was recommended. The desired reduction was accomplished but at what cost? No suspicion of any impairment of the kidneys seems to have suggested itself to any one, to put them on their guard; and the untoward result was, a condition of lithiasis was established, and in a few months Bright's disease had claimed its victim. Whenever any reduction in a corpulent person over middle age is contemplated, the possible condition of the kidneys should never be forgotten. There is much reason to believe that many persons have fallen victims to their desire to reduce their corpulence, and the adoption of Bantingism for that end. It is, really, a very dangerous practice.

Professor Ebstein's plan is free from the dangers which lurk around Mr. Banting's method. The Gottingen Professor, who has given much attention to, and has written a small book on, the subject, sums up as follows: "The permission to enjoy certain succulent things, always of course in moderation, as for instance salmon, pâté de foie gras, and such like delicacies, reconciles the corpulent gourmet to his other sacrifices. These consist in the exclusion of the carbo-hydrates. Sugars, sweets of all kinds, potatoes in every form, I forbid unconditionally. The quantity of bread is limited at most to 3 to 3½ ounces a day, and of vegetables I allow asparagus, spinach, the various kinds of cabbage, the legumes, whose value as conveyers of albumen, as Voit observes, is known to few. Of meat I exclude none, and the fat in the flesh I do not wish

to be avoided, but on the contrary, sought after. I permit bacon fat, fat roast pork and mutton, kidney fat, and, when no other fat is at hand, I recommend marrow to be added to the soups. I allow the sauces as well as the vegetables to be made juicy, as did Hippocrates, only for his sesam oil I substitute butter." This is a summary of Ebstein's creed, which is a distinct improvement upon the regimen advocated by Mr. Banting. Some modifications, however, may be suggested, such as further development of fish in the dietary. Fish of all kinds, fresh, dried, and canned, should be largely taken. Then a caution about the amount of lean meat and legumes is desirable, as being albuminoids and needed in small quantity. Salads of various kinds are good. The lettuce, the endive and celery may be added with advantage to his limited list of vegetables. The onion, kale, sea-kale, turnip-tops, do not contain so much saccharine matter as to exclude them. As to the potato, of course an objection lies against it theoretically, but when the stomach has to be filled a small quantity of potato will help to do this in a satisfactory manner. The palate must be consulted, and so must the stomach; and a small quantity of forbidden matter may in many cases be desirable. Only of course more time for the desired reduction is then essential.

Bread, biscuits, crackers, corn cakes, milk puddings, other puddings, all must ruthlessly go if the reduction has to be successful.

Malt liquors of all kind must be foresworn, and a light wine or spirits and water alone be indulged in.

As much exercise as possible should also be taken, as exertion counts off so much food.

But do not let the new regimen to be too severe, or so rigid as to affect the general health. If ill effects are being experienced, some relaxation for a while may be advisable. Where obesity is the outcome of indulgence in rich food in unlimited quantities, combined with generous drinks and habitual laziness, the regimen requisite for its reduction will be beneficial generally. But where a person is merely corpulent and yet well with it, it is a matter for deliberate thought as to how far any sudden change of regimen is desirable. Some families are normally stout just as others are lean. And as it is impossible to fatten the latter, so it may not be wise to try to reduce the former.

The treatment of obesity is the avoidance of carbo-hydrates; while in emaciation carbo-hydrates in their most digestible forms are what is required to give a certain roundness or embonpoint.

There is, however, a certain fatness seen in females at or

about puberty, and then again at the menopause, or the change of life, which is linked with anæmia. Girls or women, they become pallid, the blood goes thin, and fat accumulates upon them; specially the subcutaneous fat. With girls a quantity of red meat is as essential for cure as are chalybeates. With women at the change of life, an excess of albuminoids may tell upon the kidneys. The fatness may depend and does depend evidently in some cases, upon the deficiency of red blood-corpuscles, leading to impaired oxidation, and from that again to the deposition (as fat) of the unconsumed carbohydrates. This impoverishment of the blood may be due to the pressure of some poison in the blood breaking down the red blood-corpuscles, or hindering their formation, and in such cases the removal of the toxic element is the first step to be taken; after which, the cause being removed, all goes well. Such a case came under my notice some time ago. Gout here was the underlying causal factor; and the clearing away of the toxic agent by uric acid solvents was in one case followed, and quickly too, by the re-formation of red blood-corpuscles, and a reduction in the adipose tissue. But the reduction of the fatty tissue in ladies at the change of life—especially if some malnutrition of the muscular wall of the heart be also present—is not a matter to be lightly undertaken, and requires considerable judgment.

When a person is naturally stout and leads a rational life, taking exercise and eating in moderation, any great reduction in bulk is a questionable advantage. But where obesity is the outcome of gluttony and laziness, then a change all round is certainly desirable. But even then a sudden reduction in bulk is not without certain drawbacks, and entails an exercise of the judicial powers.

When a reduction in bulk has been achieved, persistence in the dietary is necessary in order to prevent increase in weight; and a regulated dietary—an irksome matter to say the least of it—must become the rule of life.

CHAPTER XXXI.

THE FOOD IN INDIGESTION.

PROBABLY none of the topics in the connection of food with illness is more interesting than the one now to be considered. It will be necessary to go into some detail in the matter, as "indigestion" covers a large field.

The first matter in this consideration is the physiology of digestion, which has been spoken of before, but must be glanced at again. First so much farinaceous matter is rendered soluble by the action of the saliva. The saccharine elements of our food and the soluble outcomes of starch pass readily through the wall of the alimentary canal; and so the stomach is relieved of their presence. What starch remains untouched by the saliva passes through the stomach (unaffected by gastric action), and finds in the intestines the pancreatic solvent. In the stomach the albuminoids of our food alone are acted upon. That is the second section of the digestive act. The third and last is the pancreatic digestion, where starch, albuminoids and fat, all are dealt with.

Gastric indigestion then may be due to

1. Too much undigested starch in the stomach; or
2. Albuminoids too hard to be dissolved; or
3. Fat floating about in the stomach, offending it and interfering with its proper work.

In these cases the stomach may be equal to its duties if the dietary be adjusted properly.

Then there is indigestion based on the stomach having more food in it, *i.e.*, a larger bulk of contents than it can deal with. Here smaller quantities of food must be taken at once.

Finally the stomach itself may be at fault and be unequal to its duties. This will take two directions,

1. Deficiency of gastric juice:
2. Defective muscular movement.

The late Dr. Arthur Leared held that pain is the proof of the first; and a sense of distension (with flatulence) the evidence of the other. In many cases the two are combined.

These last causes of indigestion may be due to organic disease, but by no means necessarily so. Functional incapacity in the stomach may, and often does, exist without organic change. It may or may not be followed by structural or gross alterations.

When the stomach is at fault then some medicinal measures are called for, which cannot be considered here. Frequently a little artificial pepsin in addition to the amount furnished by the incapable stomach will enable the labouring viscus to get over its difficulty. Often the addition of carminatives and condiments to the food will relieve the flatulence. But granting all this, and not attempting to underrate its importance, the main matter with primary or gastric indigestion is the food taken into the stomach.

In the first place it must be of such character that it can be properly disintegrated by the teeth, and be so reduced by mastication as to be in a fit state for the stomach to act upon it. If such dental preparation has not gone on, then the food reaches the stomach in an unfit condition; and consequently that viscus is incapable of dealing with it. Defective teeth, the habit of bolting the food unchewed, and unsuitable character of the viands, are the main causes of this form of indigestion. Certain things, as pastry, where fat and flour are kneaded together into a mass not readily disintegrated; cheese, nuts, bits of hard meat or gristle; hard pieces of potato, cabbage or other vegetable matter; all vex the stomach.

In the case of Alexis St. Martin, Dr. Beaumont found that such articles offended the stomach, arresting the flow of the gastric juice, and causing the lining membrane of the stomach to be dry and red. From this we can understand the notorious clinical fact of the above-mentioned articles provoking indigestion in a delicate, sensitive, or feeble stomach. Persons who can eat most articles of food with comfort find these indigestible articles to cause them suffering. Consequently they should be scrupulously avoided.

Where mastication is defective owing to the loss of teeth or their decayed condition, the aid of the dentist must be invoked. After the teeth have been put right and are in working order the stomach is no longer outraged by lumps of food upon which it can exercise no solvent action.

Where the habit of eating quickly obtains, and the food is bolted or flapdragoned, and thus the stomach offended, a more rational method of eating is the cure—or at least a great part of it.

Matters infiltrated with fat are provocants of painful and imperfect digestion. A badly fried sole is a notorious offender in this

respect. If the cook do not have her fat properly hot, it soaks through the fish, and the muscular fibres so becoming coated with oil are beyond the reach of the gastric juice. Fatty meat, as the flesh of the goose and duck, are avoided by dyspeptics. Such fat-swathed muscular matters are as burdensome to the stomach as quantities of undigested starch.

These are gross and tangible matters, obvious even to the uneducated eye; matters which merely require to be pointed out in order to be comprehended. But beyond these there are subtler matters, such as the difference betwixt veal and chicken, pork and rabbit.

Meat hard of fibre is indigestible, as pork and veal; then beef; then mutton and lamb. Even parts of the same animal vary. A piece of hard neck of mutton is much less digestible than the loose fibre of the meat on the sheep's head. A veal cutlet contrasts with a sweetbread. A salmon steak contrasts with a whiting; though fish are as a rule more digestible than the flesh of mammals. The flesh of fowls is widely different, as a succulent duck compared to a partridge. Game is very digestible with its short fibre; while goose is not only rich and greasy but its fibres are longer and coarser than is the case with game. A leg of a chicken is less digestible than the breast.

Articles that are flatulent cause indigestion, and consequently many persons of feeble digestion have to eschew the legumes as the bean and the pea. Peas bear an evil reputation; and especially in the dry form. Vegetables as a class are regarded as "windy." Uncooked vegetables are to be avoided by dyspeptics not only on this account, but because uncooked vegetable matter does not readily undergo disintegration.

The presence of starch granules in considerable amount in the stomach is a fertile source of gastric suffering. This is an aspect of the subject far too little considered; and yet it is a matter of great importance. The gastric juice has no action upon starch granules. This is quite a different matter from mere masses of farinaceous matter like pastry or pie crust. The disintegration may be perfect, or fairly so, still the starch granule is as indigestible in the stomach as so many minute particles of glass. Commonly, however, there is a combination of causes in action, as more perfect disintegration by the teeth would necessarily bring the starch granule into contact with the saliva. But putting this matter aside for the moment, and considering the farinaceous matter simply as an aggregation of

starch granules; these last, if sufficiently numerous, hamper and obstruct the action of the stomach. They absorb fluid; they add to the burden borne by the stomach as to its muscular movements. They incommode it; and therefore are obstructive and undesirable.

In order to get rid of any superabundance of starch granules the dyspeptic ought to take the farinaceous articles of food first, and adopt the rule of the nursery, viz., pudding before meat. If the milk pudding be taken first, then the saliva can act upon the starch in the mouth, in the gullet, and in the stomach before it becomes acid. By so doing the starch would be rendered soluble (and so escape through the wall of the stomach), and would get out of the way, leaving the stomach free to deal with the meat which comes after it. That is the common-sense view of the subject; and a following of the natural order of digestion. But custom bars the adoption of such measures. The dyspeptic must rise above custom. That is all that can be said.

Then there comes the question of dealing with the starch granules previous to their being taken into the mouth. As has been pointed out before, exposure to heat not only cracks the starch granule, but renders much of it soluble as dextrine. Where the application of heat is made by the malting process there is also the action of the diastase upon starch. In cases, then, where the presence of raw starch granules offends the stomach, cereal matters which have undergone a preparatory digestive course must be chosen. There are many in the market; before long there will be many more. In the meantime the cook can put her farinaceous matter in the oven by itself for some time before proceeding to heat it in the ordinary manner for a milk pudding. Or starchy matters which have undergone some preliminary digestion can be used for soups or broths. Of old, bread well boiled and put through a sieve was used either as "bread jelly," or added to milk or soups. By so doing, and taking these matters as the first course at dinner, a sufficient supply of grape-sugar would be furnished to the body for combustion-purposes; while the stomach would be left unembarrassed to proceed with its own work.

It is all very well to point out how much trouble and expense this will entail; but then it is unavoidable if the system is to feel up to working point. The dyspeptic is an unfortunate being—in many ways to be sincerely pitied.

Where the stomach is offended by the presence of fat, and especially fat en masse, or in the language of the nursery in "dol-

lops," such source of offence must be avoided. Very often, if the fat be hidden from sight, the objection to it is lessened. Where fat is not well tolerated it is prudent to conceal its presence. The stomach if left unprejudiced may be more lenient as to its presence. It may be necessary to eschew the fat of animals and compensate the want of this by butter. Butter mixed with potatoes, butter hidden in milk puddings, butter melted with fish: these are comparatively unobjectionable. Where no such compromise is possible, then fat must not be taken till the work of the stomach is over. If the meal be of digestible character, in from one and a half to two hours the fat may be taken as cream (with maraschino or other liqueur), as cod-liver oil, or as an oil emulsion.

What each individual can do, or must do in order to come to terms with a tetchy stomach, is a matter of experience in each case: and only to be ascertained by trial, and indeed repeated trials. Nor is the stomach always the same as to tolerance. What can be endured at one time is intolerable at another. Whenever the system has been taxed or upset the stomach becomes intolerant. Thus when the system is wearied the stomach is bereft of much of its capacity, and food ordinarily well-borne disagrees; and what is more, the gastric revolt tends to become chronic. An American lady-patient, with dyspepsia, traced her woes back definitely to a certain dinner at Genoa. After a long day's journey she and her fellow travellers arrived at the hotel just as the table d'hôte was being served. They sat down and made a hearty meal. This outrage on a weakened stomach in her case led to persisting indigestion. She had then suffered for seven months: and by the greatest consideration had attempted to atone for the original outrage. Offence and repentance are necessary with an injured stomach—which may be as unforgiving as a Corsican.

Then again any mental perturbation may make itself felt either as by loss of appetite or by indigestion. Bad news, received during or shortly after a meal, substitutes for the usual comfortable sensations that of a stone in the stomach—as the food lies motionless in a palsied viscus. There is no doubt that the digestive powers of the Anglo-Saxon are waning. Our early ancestors were equal to a feast after a hard day's marching or fighting; but not so their nineteenth century descendants, who when their energies are taxed find the stomach impaired in digestive capacity. Dr. Pavy says that this fact is recognised by experienced sportsmen.

Then again there are stomachs which resent the presence of

fluids, and, contrary to what is usual in indigestion, only dry food agrees. In most cases of dyspepsia liquid or semi-liquid food, either meat-infusions or milk with some carbo-hydrates, sits easiest upon the stomach. But in these exceptional cases all fluid as far as possible has to be avoided. If this be rigidly done then digestion goes on normally and without discomfort.

Having thus reviewed the causes of indigestion, and its forms and varieties, it may be well to consider its quantity or extent. In some cases the defect is so slight that if the more notorious of indigestible foods be avoided all is well. Pastry, uncooked vegetables, nuts, are to be eschewed: but nothing more under ordinary circumstances. Others again cannot take pork, veal, or cheese without suffering for their indiscretion. Then come those who may not eat cold beef, or a beef-steak, but who can manage mutton. For all these, artificial pepsin may be enough to get them over their difficulties. Persons who are no worse than this have not much to complain of; they may be put to inconvenience now and then, especially when travelling.

Then come those more gravely afflicted, and who really have to be very careful about their dietary. They must pass the vegetables as a rule, take very little animal food at once and that only of the most digestible character. Fish, especially white fish, and boiled or baked rather than fried: chicken, rabbit, or a sweetbread, are the chief articles of food with them. They are restricted to milk-puddings; and other puddings have to be foregone.

With such persons matters are growing serious. They can get on fairly well at home with a cook trained to meet their special needs; but all dining out is next to impossible, while hotel life is burdensome to them. It is well for them never to forget to have some pepsin near at hand when eating a meal away from home.

The indigestion of males rarely goes beyond this except in the case of consumptives, or persons with some affection of the stomach, or some acute disturbance of a naturally irritable stomach. But with females a further limit is not uncommon, and then the question of a sufficiency of food to sustain life becomes really grave. Only liquid and semi-liquid food can be endured by the stomach, and that too in limited quantities at once. Small quantities of meat-infusions containing some predigested starch, milk with or without some malted preparation, a baked apple, or the juice of some stewed fruit; such form the dietary. It is not an easy matter to "ring the changes" when the choice is so restricted; and, very

possibly, the appetite is small and the palate dainty. The body-income is necessarily small, and cannot be raised. Then let the body-expenditure be reduced to the minimum. The patient must go to bed; and, surrounded by bed-clothes in a warm room, the need for fuel-food is brought down to the lowest point; while perfect quiet reduces the demand for food to supply force. Rigid economy is necessary with small means: and this has a wider application than is commonly attached to it. It applies to the body physically as well as to social units financially. A small income is incompatible with much expenditure. Beggary is the alternative. The same with the body if the outgoings exceed the incomings, then exhaustion of the body-capital is inevitable.

The smaller the bulk of the food which can be taken at once the shorter the interval must be betwixt meals. Even when the wonted fare can be taken, but only in limited quantities at once, a small amount of food betwixt meals is usually a good practice, especially in cold weather. When the patient is reduced to the condition just described, the intervals betwixt meals must be made very short. Possibly it should not exceed two hours in some cases. The fast of night is injurious. There is a well-recognised tendency to a lowering of the body-energies in the small hours of the morning. Some food about 2 A.M., is most desirable. With many ladies of small digestive capacities such nocturnal meals add materially to their comfort and enjoyment of life. Such persons of course are readily made actual dyspeptics by any indiscretion; and remind one of those crazy individuals who sometimes are so mad as to necessitate their being put under restraint in an Asylum; with such good effects that they are in time sane enough to be at large. Uncontrolled, they ere long become so insane as to require the Asylum restraint once more. And there are persons whose stomachs resemble these crazy brains. Indiscretion in food produces pronounced dyspepsia, requiring a strict regimen for a time. On this distinct improvement is made until the wonted state is reached; but before long some upset necessitates the curative regimen once more. And such is the history of myriads of dyspeptics. And the lesson it teaches is the lesson they will not learn—as a rule, viz., that extreme watchfulness, unwinking, sustained, and enduring, is the only protection against a digestive breakdown.

Probably this class of dyspeptics furnishes more patients than any other, especially among ladies. Indeed, if not possessed of means they could not long exist; for their extreme potential body-

income could never enable them to toil. They are often very intelligent in everything but their food-requirements. Even when they are very careful, their politeness often brings them to grief by inducing them to eat something which they know from experience disagrees with them, but which they do not like to refuse.

Of this class of person Dr. Pavy speaks as follows—"Where chronic impairment of power exists, as in ordinary dyspepsia, the patient must be guided by what it is found by experience will agree. Whilst avoiding that which is known to be of an indigestible nature, and whatever, through idiosyncrasy, may happen in particular instances to upset the stomach, the maxim of management should be to keep the diet as closely to what is natural as the circumstances of the case will permit. Frequently, because a person is suffering from dyspepsia, he is recommended to leave off this and that article of food, and may perhaps in the course of time be reduced to taking exclusively, or almost exclusively, liquid nourishment. Such in itself is sufficient to lower the already enfeebled power of the stomach. The organ, getting no employment, becomes weaker and weaker, and is also prejudicially influenced by the defectively nourished state of the system. The aim of the physician in these cases should be rather to raise by appropriate treatment the digestive capacity to the level of digesting light but ordinary food, than to reduce the food to an adjustment with a low standard of digestive power."

This aspect of the matter is here well put. Instead of cutting off one by one the different articles of diet, it would be better in every way to be able to tell the unfortunate dyspeptic of some new article of food which can be taken safely. While introducing into the stomach the food requisite and indispensable for the body-needs in any possible shape, the aim is to raise the digestive capacity by appropriate medicinal measures as well as suitable food. Where the system at large is badly nourished the stomach shares in the general enfeeblement. Predigested food may be unavoidable to raise the general tone; not to relieve the stomach of all work. Too ready resort to peptonised foods may really still further lower the capacity of the stomach. On the other hand, any indiscretion may throw the case back and all the labour be thrown away, and a new start be necessitated. Consequently, the treatment of indigestion is not a matter of off-hand directions, but of deliberate thought over each case with its individual requirements. Too frequently the dyspeptic leaves off one article of food after another until the palate

loathes the few remaining articles of diet, and the starving creature often fasts sooner than eat them. The body must be fed until the digestive capacity is regained, if possible. That, by a judicious dietary and proper medicinal measures the digestive organs can be restored to a fairly capable condition, is a matter of fact. But in bad or confirmed cases the loyal co-operation of the patient must back up the wise counsel of a competent physician; any defect in either being fatal to success. When dyspepsia is linked with chronic constipation—a common occurrence—this matter must be pointed out to the patient clearly and forcibly. Such patients rarely possess the perseverance indispensable to success. If the patient does persevere courageously the reward comes. We get what we deserve in life to a very great extent, and the maxim certainly holds good of persons of weak digestive power.

There are two matters dyspeptics must ever attend to: (1), never to touch meat that has been twice cooked, though this holds less against fish than other meat; and (2) fat which is rancid, or which has been exposed too long to heat, or to too high a temperature. One American patient could eat cold butter in any quantity, but a fried whiting was an outrage to his stomach.

When a dyspeptic is reckless (as was in all probability the case with the late Tom Carlyle, the philosopher), he endures a great deal of avoidable suffering. But many dyspeptics are of this class, and especially intellectual dyspeptics. They perpetually commit outrages on their digestive organs, and suffer for them, but all the same they hold on their own way. Experience does not teach them. They are very unsatisfactory patients.

Others again commit these recurrent outrages not from wilfulness but from forgetfulness. While the subject is being discussed in the physician's study they are alive to all that is said, and endorse it all. But when their minds are occupied by other matters all this is forgotten, and the indiscretion committed; and it is only when the unpleasant consequences put in their appearance that they become conscious of their forgetfulness.

The most unfortunate matter is that one such act of forgetfulness may undo a long labor of careful dietary, and throw the patient back to climb the painful ascent. It is the stone of Sisyphus once more.

But one curious well-recognised fact there is in connection with indigestion, viz., when the craving for a certain article of diet is very strong, even if it be of a most objectionable nature as regards

dyspepsia generally, it commonly happens that it does not disagree. How and when it is safe to permit the gratification of such craving is a matter yet hidden from us.

Still, all the same, modern chemico-physiological knowledge has done much to enable us to help the dyspeptic in his troubles; especially when the patient is resolute about being relieved.

Gouty Dyspepsia.—Whatever the difficulties to be encountered and overcome with the ordinary dyspeptic, they are enhanced in the case of the gouty dyspeptic. The reader will remember what is said, in the chapter dealing with gout, about hepatic reversion and the formation of uric acid. Whether uric acid finds its way into the gastric secretion, or not, is a matter shrouded in darkness. Certain it is that the gouty dyspeptic is troubled with acidity. Uric acid solvents are distinctly indicated, and without them mere dieting, however carefully carried out, is but partially successful. There is, too, in these dyspeptics a decided tendency to form rancid fatty acids in the stomach from any fat that has had too much of the fire. Consequently all fried meats are to be avoided, even down to fish. Their fish should be boiled, or baked, and what is left cold should be served up as fish pie, which must not be too long in the oven.

Then again they find sweets too readily turn acid in the stomach, and especially the cane sugar added by the cook to fruits. As a rule a gouty person is not a "sweet tooth," and sweets are abjured by them. Still many would like to take stewed fruit, if this could be done with impunity. As much bicarbonate of potash as will lie on a shilling, or a quarter-bit to each pound of fruit when put into the oven to stew, will neutralise the acidity, and bring out the natural sweetness of the lœvulose sugar in the fruit which is masked by the free acid. Such stewed fruit will not only not readily turn acid, but it provides an uric acid solvent in a very palatable and unobjectionable form. By using canned fruit in winter and spring some stewed fruit can be had all the year round. Or a baked apple can be eaten instead.

Milk puddings made without eggs should form a large portion of the dietary, and these should not be sweetened by cane sugar but by other sugar, as milk sugar or lœvulose. An admixture of malt with farina perhaps gives the best result. Farinaceous matter which has previously been exposed to heat, as shredded maize, cooked hominy, malted rice, or broken biscuit, etc., should be stirred up with an equal quantity of ground or crushed malt in a pudding dish, and over this should be poured milk hot enough but not too hot to be

sipped. The dish should be placed where it will not get cooler (and not much hotter) for ten minutes, after which it can be put into the oven long enough to become sightly. Such pudding does not require to be kept in the oven till it is "enough"—as is the case with puddings made with farinaceous matters which have had no previous acquaintance with heat—for the materials have already been cooked. Such puddings will not turn sour with most gouty dyspeptics, though the opposite may be the case with a small proportion.

Then a staple article of the dietary will be soups of all kinds, thickened with broken biscuit, malted rice; or cooked farinaceæ as the A. B. C. cereals, the farina cocta, shredded maize, baked hominy, etc. If sago or tapioca be used, either should be placed in a dish in the oven for an hour or two hours, care being taken that the farinaceous material is not scorched. Or the sago, rice, or tapioca should be well boiled ere adding them to the soup. By so doing the risk of filling the stomach with quantities of insoluble starch would be avoided; a matter which has been discussed in the early part of the chapter.

Farinaceous matters—supplying the essentially necessary grape sugar to the body—must form a very large portion of the dietary with gouty dyspeptics, and must be so treated as to give as little trouble to the digestive organs as possible. The more such farinaceous matter has been exposed to heat the better, and the less digestion they require within the body.

Soups made with cooked farina, boiled and baked fish, milk puddings prepared as directed, baked apples, and fruit stewed with potash, grapes, bananas, and such natural fruit as agrees, carefully masticated so as not to offend the stomach by tangible lumps, must form the staple dietary of the gouty dyspeptic when the stomach is very irritable. When a careful curative course has led to a better state of affairs then some chicken, rabbit, tripe, sweetbread and like digestible matters may be eaten. Well-mashed potatoes with cream, or butter and milk warmed together, put down before the fire to brown (better than being put into the oven), in order that heat and moisture may still further modify the starch granule, will form a desirable change.

Cold fat is less apt to form fatty acids than warm fat; and biscuits—the plainer the better—and butter should form a considerable portion of each meal. All sweet biscuits contain cane sugar, and so are apt to turn acid. Those which are made with malt are less objectionable. Cream with stewed fruit is also a suitable fat.

As to beverages, a little claret or wine of like character, with some alkaline water, (better if effervescing), or perhaps alone, may be desirable. Or a little pure spirit and much water may be preferred. As to tea, coffee, and cocoa, there seems little objection to them, unless one or the other be found actually to disagree. The cane-sugar added to sweeten them is the cause of much of the acidity erroneously attributed to the beverage itself, it seems to me. Milk with equal parts of some mineral water, as seltzer, if mild alkali be needed, or Vichy, or Vals, if more alkali be desirable, forms a suitable beverage.

Like all dyspeptics the gouty dyspeptic must give his mind to the treatment of his own case. If the dietary is restricted and the regimen irksome, the sufferer must remember that he is the person benefited; and that it is only by the observance of strict dietetic rules that relief is to be obtained. The power to help is limited to the patient's determination to be helped—a matter the dyspeptic must not forget or overlook.

CHAPTER XXXII.

THE FOOD IN BILIOUSNESS.

PROBABLY the contents of this chapter will excite keener criticism than any other in this book. The view taken traverses the ordinary opinions on the subject; and yet an increasing experience bears them out. Some half score years ago a consideration of the chemical composition of the bile acids led me to reflect upon their derivation; and from that again to raise a practical issue, viz., the proper food for bilious subjects.

The bile acids are two. The one Glycocholic acid with a formula $C_{26}H_{43}NO_6$; the other Taurocholic acid, with a formula $C_{26}H_{45}NSO_7$. Both contain nitrogen; and one, also, some sulphur. And these two constituents point to their origin in the albuminoid elements of our food. Then comes the further consideration that persons who are bilious in their early years are apt to become gouty in middle age and advanced life. The whole subject was one of deep interest. Instead of bile being derived from starchy, sugary, and fatty foods, reputed to be "bilious," it evidently had other associations. The dietary of lean meat, dry bread and tea, without sugar or milk, in favour with the bilious, seemed erroneous in theory. But how about clinical facts? The proof of the pudding is the eating, after all. One confirmed bilious subject, of the bilious diathesis, and wearing a look of persistent suffering, came under my care and seemed a most suitable subject for experimentation. With some difficulty she was induced to give up the meat, bread and tea, and take to farinaceous matters and milk puddings, and much to her surprise soon felt very much better for the change. Her case has been alluded to before in the chapter on Food in Affections of the Nervous System, and since writing that chapter an opportunity for going over the facts (as there stated) has offered itself and confirms them. The clinical facts fitted in with the theory so completely that further trials were made. The results of these further trials have pointed unmistakably in the direction that much albuminoid food is not desirable for bilious persons, despite the fact that they find such food sits well upon the stomach. Such food

may be agreeable to the stomach, but it certainly taxes the liver. The analogy used in "Indigestion and Biliousness" is as follows: "A young man may find favour in a girl's eyes, but her parents may not be satisfied with him. Acceptable enough to her, the very qualities which weigh favourably with her may be those on which her father specially founds his objections. That food which is acceptable to the stomach may be the very matter which disturbs the liver." Five years' further experience bears out what was written in 1881, when the book appeared.

The function of the bile is, so far as we know it, the emulsionising of fat. If fat be abjured there can exist but little necessity for bile. If a disproportionate amount of albuminoids be eaten, the material for excessive bile is provided. There is a disturbance of balance in the economy. If fat cannot be taken the excess of albuminoids can be avoided at least. And the practical result is relief to the bilious symptoms. In the present state of our knowledge it is impossible to be more explicit. Some day it may be feasible to give a more satisfactory and complete explanation. Our acquaintance with the functions and operations of the liver is recent, and incomplete; but I venture to think the rational outcomes of the above consideration will warrant some practical conclusions.

The food of the native inhabitants of warm countries as taken from Dr. Pavy is as follows: The Mexicans are "accustomed to uniform nourishment of an almost entirely vegetable nature;" while the inhabitants of New Caledonia "subsist chiefly on roots and fish and the bark of a tree;" while in Hindostan;—"From the earliest period the most general food in India has been rice, which is still the most common food of nearly all the hottest countries of Asia. Pulse, roots and fruit are also largely eaten." Ghee is in great request. In Ceylon they eat "rice seasoned with salt, and a few vegetables." In Egypt "vegetables form the principal food of the lower orders." In the Sahara desert "all live on dates." Butter and palm oil are also in demand in various parts of Africa.

The Spaniard has his bread and oil and onions. The Italian, maize and macaroni. The Turkish hamas is a vigorous man, yet his dietary is almost entirely vegetarian.

"The attention of Herodotus was called to the fact that the Persians, the manliest and most sporting nation in the old world, had at meals not only several dishes, but several courses of vegetable food, preceding a very moderate allowance of solid meat." (King Chambers.)

Set against these facts the other fact that when the Anglo-Saxon persists in his home-dietary on the plains of Bengal he becomes the subject of biliary trouble, and not infrequently of actual disease in the liver. Whereas men who adopt the dietary of the natives suffer comparatively little.

Indeed the relations of hepatic trouble to an English dietary in tropical countries is a notorious fact.

Regard being paid to what has just been said, the great object of the bilious, like the gouty, is the avoidance of albuminoid articles of food, or the taking of them in very moderate quantities. How many persons, who, when dining out, indulge themselves in meat and drink, find that a calomel pill and a seidlitz powder enable them to escape sundry unpleasant after-consequences? That fact throws some light upon the relations of the food taken to the function of the liver. Loss of appetite follows any excess in food; and what does that tell us? When the liver has more material brought to it by the portal vein than it can deal with, loss of appetite is the result; and by a period of abstinence the liver works round, and all goes on again as usual. The stomach can reject its contents. The bowels can sweep out objectionable matters. The liver can do neither. If not protected by anorexia the liver would have rather a hard time of it with persons who think that the regulation four square meals a day are a part of the Divine Scheme. Loss of appetite comes to its rescue. The bilious disturbance caused by a surfeit, especially with children, is another contribution to the subject. The liver is the furnace in which the waste and superfluous albuminoids are burnt, we are told by physiologists. When there is an accumulation, pyrexia often comes and helps on the oxidation, or in other words "Nature holds a bonfire." By such means the not readily oxidisable nitrogenised matters are burnt up.

Put briefly, with bilious persons it is well to reduce the amount of food taken to the body-needs, or as near this as can be attained. And especially is the moderation to be practised as regards those nitrogenised elements of our food from which, obviously, the bile acids are derived.

Bilious persons, then, should avoid the solid joint at meals. Joints, chops, and steaks, indeed lean meat in every form, must be taken in very small quantities, if at all. Fish, as a less concentrated form of albuminoid material, is to be preferred to flesh. Vegetables should be largely eaten. Fruits do not disagree. Eggs and milk have an evil reputation for encouraging biliousness. Fatty

and sugary matters are reputed to be bilious; but if this be so (and the view has a basis of fact) it must be indirectly and not directly. If the readily oxidisable hydro-carbons attract the oxygen of the body, the less oxidisable albuminoids will be left over,—the ashes or cinders of the body-combustion.

Farinaceous matters and vegetables should form the staple dietary, accompanied by a certain amount of fat; the amount varying with the season, climate, and locality. In temperate climates a certain amount of the concentrated fuel food, the hydro-carbons, may be required. In tropical countries the dietary consists of carbo-hydrates only, with advantage. The gastronomic proclivities may, however, go in another direction; but reason must be brought to bear upon them.

This view of the dietary appropriate to bilious persons will strike many readers as being novel, and so antagonistic to prevailing opinions as to savour of unsoundness. The testimony furnished by my limited experience may seem insufficient to warrant it being put forward so confidently. If the experience has been limited and recent it has at least been convincing—so far as the writer is concerned. It is one of those matters which can be reasoned upon rather than demonstrated. And if the reader remains incredulous there seems to the writer no means of convincing him. If he himself be plagued with biliousness let him give the matter a fair trial, and note the result. There are many matters which, if they had had to wait till they could be proved to a demonstration before they were launched into the world, would have remained unborn. On the other hand a sweeping change of opinion and practice must have some solid foundation before its propounder can expect the world to accept it. The arguments given in this chapter seem deserving of attention, and the verdict of the world can be awaited with some confidence. My experience has gone in the direction that what is sound in theory works well in practice.

The bilious person should avoid the eggs in the traditional breakfast—bacon and eggs—taking the fat of the bacon by preference. Then if there be any fish some of it should be eaten. In summer some lettuce or salad may be added; in winter some fruit, especially the apple. There exists no real objection to some cream and sugar being added to the tea or coffee. Then the lunch should consist of some soup or fish with well-mashed potatoes or other vegetable, and "pulled bread" or biscuits. Dinner should consist of some fish or chicken, a vegetable course, milk pudding, and bis-

cuit and butter. Such was the dietary on which a gentleman whose liver gave him much trouble got well, after being under several physicians of repute without avail. On his usual dietary, which embraced a considerable quantity of lean meat, he grew worse and lost flesh. This is a common story. When the liver cannot carry on the proper metabolism of proteids into the serum-albumen of the *liquor sanguinis*, but breaks them down into bile acids or urine solids, the tissues go unfed. In fact the albuminoids consumed "go to feed the disease and not the patient," to use an old-fashioned and time-honoured expression now getting lost sight of too much. Of course it is well to raise the tone of the liver by resort to hepatic stimulants at the same time. But by reducing the demand upon the liver as regards its function of dealing with albuminoids it can perform its work, and normal metabolism goes on. The consequence is the body is once more fed and the biliousness relieved, *i.e.*, the proteid matter is going to its wonted destination—the tissues, and less bile acids are formed. Recently a well-known writer of fiction came under my care with a tongue covered with a thick fur deeply stained with bile, and lithates in her urine. She too had been losing flesh and getting worse on a meat dietary with some alcohol—the proper dietetic means to get strong in popular belief. She adopted my suggestions with quick and prompt relief, and got well most satisfactorily. When the liver is out of order the ordinary dietetic means for getting strong are rather mischievous than useful. It is not what is swallowed but what is digested that is the question. Primary digestion goes on in the alimentary canal, and secondary digestion or elaboration is performed by the liver. Food may be taken and digested, but if the elaborating action is defective nutrition fails, just as much as if food were withheld in the first place. When the body is starving from liver inadequacy, to force down liberal quantities of generous food is to overtax the liver and hamper its action still further. Food rich in carbo-hydrates, and containing but a small proportion of albuminoids, is that which is really indicated and required. The appetite may be feeble and capricious, the palate may be dainty and have its preferences; these may be met, but after all the function of the liver must be remembered; and with it the true body-needs.

Grape sugar, the fuel food of the body, must be supplied in sufficient quantities. Albuminoids for tissue repair, too, are required; but the amount actually necessary for that end is but small. All beyond the bare necessaries are superfluous and only hamper and

embarrass the liver; and increase the amount of bile acids, or urine solids, as the case may be. That is the lesson taught us by modern advances in physiology and clinical medicine.

This is all rank heresy in the opinion of the people at large. When a person is below par, plenty of animal food and good wine, tonics with iron, are the things to get him up—certainly in most cases; but when the liver is involved there is an error in the equation. So long as the liver is competent to its work, so long the equation is correct; but when the liver is unequal to its work this regimen but further embarrasses it. The number of stories told one of the failure of this plan to get them strong, by different patients, is conclusive. A number, too, furnish some curious corroborative testimony. They bring a specimen of urine for examination in a bottle; and not infrequently that bottle has on it in raised letters "Quinine and Iron Wine." It has signally failed in their cases. A look at the tongue and a few well-directed questions soon lighten the matter up; and on a different regimen, dietetic and medicinal, improvement sets in. But these persons are often hard to convince. At first sight it does seem an odd way to increase the strength, viz., cutting down the food, and especially the animal food. But the alteration is soon felt. "She stoops to conquer." And this manœuvre can be practised with satisfactory results in hepatic inadequacy. No chain is stronger than its weakest link. The appetite may be fair, the stomach capable; but the liver is weak. The nutrition is defective usually when the liver is incapable, and the appetite fails. That is Nature's way of attaining a new balance by "levelling down." But an appetite is held to be a man's inalienable right; and so he tries artificial means to create one. He defeats his own ends. He is thwarting and traversing nature's provisions, and so the plan fails.

When the liver is incapable it is well to reduce the demands upon it to its capacities.

So much for the dietary in biliousness.

Now about the drink. A naturally feeble liver cannot get on with malt liquors. Whether it is cholæmia or lithæmia, malt liquor is pernicious; especially with persons of the "Arab" type, *i.e.*, highly developed nervous system and small viscera. Malt liquors prepared by the English system of brewing are specially injurious to an incapable or sensitive liver. The beers brewed upon the German or lager system are less objectionable; and many "liverish" persons can drink beer on the Continent who cannot touch it in

England. Generous wines too have an evil influence. The wine must be poor for most bilious persons. Often even wines must be foresworn and some weak spirits-and-water form the sole beverage or food adjunct.

Abstinence, both as to meat and drink, must be the rule with persons who possess an insufficient liver.

This may seem a hard conclusion, but it is a simple expression of the facts. How far people can inherit an insufficient liver, is a matter about which there is not much doubt: we know gout runs in families, and so does biliousness. Has the advance of civilization a deleterious effect upon the viscera? Does the heir of all the ages find amidst his rich inheritance a waning capacity in the liver? It would seem so, at least, in many instances. There is no apparent impairment in the physique of some families whose history is known, as, for instance, the reigning family in England. But while this is quite true of some families, there is much evidence, and accumulating evidence too, that when the fathers have eaten sour grapes the children's teeth are set on edge. Dr. Murchison follows Dr. Budd in thinking most persons have competent livers, but "in others the liver seems only just capable of performing its functions under the most favourable conditions, and it at once breaks down under adverse circumstances of diet, habit or climate. This innate weakness of the liver is often inherited. The person is born with a tendency to biliary derangements."

When a person, man or woman, inherits an insufficient liver, gastronomic indulgence is thereby forbidden under a penalty.

CHAPTER XXXIII.

FOOD GIVEN OTHERWISE THAN BY THE MOUTH.

THERE are certain morbid conditions in which it becomes necessary to feed the patient otherwise than by the mouth. Especially does this becomes necessary in acute disturbances of the stomach. There are, however, other circumstances where such alimentation becomes desirable. Sometimes the appetite is so small, or the distaste for food so strong, that the amount taken by the mouth is insufficient for the wants of the system. Under such circumstances it becomes desirable to eke out these scanty meals by some food given *per rectum*. Under other circumstances, especially with marasmatic children, it is well to use inunctions with oil.

Before proceeding to describe nutritive enemata and their constituents, it may be well to consider some anatomical and physiological facts which will guide us in practice. When food is given by the mouth it meets with the digestive ferments; first, the saliva; second, the gastric juice; third, the pancreatic secretion. The large intestine has none of these. The secondary digestion in the colon is somewhat of a misnomer, and as such misleading. "Of the particular changes which take place in the large intestine we have no definite knowledge, but it is exceedingly probable that in the voluminous cæcum of the herbivora a large amount of digestion of a peculiar kind goes on. We know that in herbivora a considerable quantity of cellulose disappears in passing through the canal, and even in man himself some is probably digested. We are driven to suppose that this cellulose digestion is carried on in the large intestine, though we know nothing of the nature of the agency by which it is effected. The other digestive changes are probably of a fermentative kind. Be that as it may, whether digestion, properly so-called, is all but complete at the ilio-cœcal valve, or whether important changes still await the chyme in the larger intestine, the chief characteristic of the work done in the colon is absorption." (M. Foster, F.R.S.)

The only matter we are certain about is the absorption of soluble matter. Starch must then be converted into soluble products for a

nutrient enema. Proteids must be converted into peptones for the same reason, *i.e.*, that there is absorption certainly. As to fat, it is highly questionable how far it is of use in a nutritive enema. Fat is emulsionised in digestion and in minute globules passes into the mouths of the lacteals in the intestinal villi; which, as M. Foster puts it, may be said to "eat the fat globules." But the intestinal villi cease at the ilio-cœcal valve; and therefore the fatty matters of nutrient enemata can be of little use. This is an important matter, on which it is well to have clear ideas. Bidder and Schmidt, in a case where there was a duodenal fistula, found that "Fats introduced into the lower part, where they could not be acted upon either by the bile or the pancreatic juice, were but slightly digested"(M. Foster). There must, however, exist some other mode by which fats can leave the alimentary canal (probably as soaps) for "the portal vein during digestion contains more fat than the general venous blood," the same authority tells us. It can, however, not, so far, be shown that fat can pass through the walls of the large intestine. The same authority quotes from Bauer—"Absorption from the large intestine after injection *per anum*, or through a fistula, has been observed not only in the case of soluble peptones and sugar but also in that of the white of egg, caseine, and starch." But there is no mention of absorption of fat. Consequently we may say that fat is practically useless in a nutrient enema because it is not absorbed; and that when the system needs fat it is of no avail to give it by enemata.

Of old a nutrient enema consisted of beef tea, the yolk of an egg, and milk. Of these different materials probably the extractives of the beef tea and the milk-sugar of the milk alone were absorbed—to any extent at least. If brandy were added, probably it, too, was absorbed. Of the other matter, as the casein and egg albumen, some were possibly absorbed.

The bowel really is adapted only to the absorption of matters which have been digested above in the small intestine. If matters be introduced into it from the other extremity, they ought to have been subjected to a like action previous to their occupation of the lower bowel. The ilio-cœcal valve bars their entrance into the small intestine where digestion—as differentiated from mere absorption—takes place. If not predigested they are not fitted for absorption.

Nutrient enemata then can conveniently consist of soluble carbohydrates and peptones. The disagreeable glue-like flavour of most peptones constitutes no objection to their use here. Indeed peptones

and peptonised gruels, are excellent matters for nutrient enemata. Malt preparations, malt foods, and malt extracts are admirable material for enemata. Or milk-sugar, or dextro-saccharum, or even lœvulose sugar, especially as treacle.

When acute gastric disturbance is on foot, then the nutrient enema should consist of soluble carbo-hydrates, meat peptones, and if necessary a little brandy. When there is anorexia and a febrile state co-existent, the utility of albuminoids is less certain; as probably no histogenesis then goes on (as pointed out in a previous chapter). But of the utility of matters furnishing grape-sugar to the system in its hour of need there can be no question. Recently in a case of chronic bronchitis and emphysema the appetite dropped dangerously low even for a lady in bed in a warm bedroom. Here a nutrient enema of Mellins's Food and peptonised milk night and morning just made the difference betwixt slow starvation and improvement. I could have liked to have something to say about the utility of nutrient enemata in the attacks of acute gastric disturbance in phthisis; but unfortunately am not in a position to say much. On *a priori* grounds there is a great deal to say; but how the actual facts will turn out is not so certain. If readers of this work who try nutrient enemata in such cases would put their experience on record we should soon have a body of evidence which would be highly valuable, whether for or against. If favourable, our hands are strengthened in a very trying crisis. If it turn out but a broken reed it will be well to know it, so as not to put faith in an untrustworthy measure at our time of trial.

A large tablespoonful of soluble carbo-hydrate as malt-extract, or Mellins's, or other malt preparation, or milk sugar, or a small teaspoonful of meat peptones in an oz. of warm water, would form something like what is required for a nutrient enema. Such a small bulk would probably be well tolerated by the not very sensitive large intestine. And repeated twice, thrice, or oftener daily would make a substantial addition to the body-income.

How long nutrient enemata may be continued depends upon the condition of the anus. If this become very sore and sensitive they may have to be discontinued after a short trial. (The utility of an opium suppository in such anal sensitiveness suggests itself, or some other local application). If the anus remains insensitive the nutrient enemata can be continued for a longer period. On this matter we have much to learn. When we give an enema to flush out the contents of the large intestine we require bulk to distend the pouches of the colon in which the fæces lodge. But for

nutrient enemata a small bulk is desirable in order that it may be retained and not be cast forth.

We can see a great future for nutritive enemata now that the proper materials for them can readily be procured; and increasing knowledge will teach us many minor points to be attended to, of which probably something can be said in a future edition.

Very recently "rectal alimentation" by nutrient suppositories has been advocated; and in some cases has been found useful. The component factors of nutrient suppositories will be limited by the anatomico-physiological facts of the wall of the colon and its capacities (pointed out in the early part of this chapter), especially what is said about the non-absorption of fat by the bowel. That nutrient suppositories of soluble carbo-hydrates and peptones may come to have a high practical value seems eminently probable. Even if these nutrient bodies have but a limited scope, this may still be enough to give them an incalculable value in times of emergency, when life is quivering in the balance and a trifle will cast the beam. And it is in our capacity to provide these apparently little matters in the nick of time which constitutes a great part of the utility of the medical profession. Sometimes a practical grasp of the exigencies of the case, and the knowledge how to cast the quivering balance, far outweigh in real value an elaborate but sterile diagnosis of minutiæ in such hours of need. Emergencies are indeed often the test not only of the possession of knowledge, but of the capacity to make use of it. A nutrient enema at the proper moment may have life or death hanging on it.

Of hypodermic injections of nutritive fluids little can be said. Accounts of such methods of feeding have been published doubtless, chiefly by foreign physicians; but they appear rather to belong to the curiosities of medicine than as part of the working apparatus of daily practice. For matters of small bulk, as potent medicines, the injection syringe is of priceless value; but of concentrated foods adapted for injection purposes we know nothing.

Transfusion of blood scarcely comes under the heading of dietetics.

Then come inunctions of oil. How fat is absorbed by the skin is a matter on which little is known; at least, nothing about it is known to me; but about the fact there can be no question. When attached to the West London Hospital numbers of poor starvelings were among the out-patients. With many of these mites the addition of some cod-liver oil to their scanty fare caused much improvement. With others, however, it became necessary to resort to oil

inunctions. The effects varied; some babies began to improve at once and rapidly, while with others the progress was much slower. But on the whole the results were satisfactory.

In some instances such inunctions have been found useful with adults where the assimilative organs were unequal to much work. It is not unusual for phthisical patients to apply cod-liver oil to the chest when it is not readily taken by the mouth. The oil is absorbed and does good, but the plan is an unsavoury one.

When oil inunctions are indicated the room should be made warm and all draughts excluded; else the exposure may be injurious. (A poor little infant readily feels any heat loss). Then the skin must be made perfectly clean with hot water and soap, with a piece of flannel or a sponge. After this has been done the oil can be applied. It is well to allow the oil to get warm by the fire while the preliminary operations are going on. About half an ounce (a tablespoonful) is enough at once. About a teaspoonful should be poured into the palm at once, and this should be rubbed well in over the trunk and limbs. How much of this is absorbed I do not know. The undergarment of course becomes oily, and how much absorption goes on after the rubbing I do not know. But, however it comes about, the process gives satisfactory results.

Adults, or children of larger growth, who require oil inunctions are usually—or ought to be—in bed, (in order to reduce the body-expenditure). With these it has been found convenient to anoint one half of the body at once; taking the other moiety in turn. In certain cases this method of feeding proves very useful. In cold weather such coating of oil is found very comfortable. It is not a cleanly method, however, and has nothing to be said for it except its utility in times of need.

Such, then, are the methods of feeding otherwise than by the mouth. They are all objectionable and repugnant to the feelings, and to sensitive persons simply intolerable. Still there are circumstances under which these methods are advantageous, and i is well to know of them and about them when the emergency arrives. As to the choice of oil, probably an animal oil is more easily absorbed than a vegetable oil. Of these neats-foot oil is the least offensive. When this is offensive then olive oil can be resorted to. Probably this was the oil used by the early Christians, who when sick were anointed with oil and prayed over by the elders of the Church, according to St. James.

Inunctions of oil are less frequently called for than nutritive enemata, which are often of much service.

CONCLUSION.

THE perusal of the foregoing chapters will, it is believed, convince most readers that there is much more to be said for food and feeding in disease,—alike in acute maladies and mere chronic affections,—than at first sight seems probable. To know what food is required in each morbid condition is a matter too little attended to in medical teaching. Medical teaching is conducted in hospitals, and in hospitals for obvious reasons the dietary is arranged in scales of varying liberality. This unavoidably leads to routine—hard and fast lines which are not elastic. Consequently, dietetics are matters picked up by the medical man mostly from his private patients; and probably his first real lessons come from some intelligent patient, or friend of a patient. Beef tea he knows from the hospital, and milk and lime-water or seltzer water; but the rest he acquires as he can. Some men pick up a great deal, others but a little. The Professor of Organic Chemistry tells him little or nothing about the food-value of food; the Professor of Physiology describes digestion to him, but does not describe the various forms of food; the Professor of Practice of Physic gives him directions as to the choice of medicines, but probably never mentions food except when discoursing on diabetes; the Professor of Materia Medica gives a careful account of the different members of the Pharmacopœia, including their actions within the body, but as for food, he has no word to say; while the Professor of Surgery may speak of a bread-poultice or a beef-steak for a black eye; but that is all.

If some systematic lectures were delivered, even if only of an elementary character, the student would have some broad rules to guide him in his choice; instead of being left pretty much like a ship without a rudder. It may be thought by some readers presumptuous for a person not actually engaged in medical teaching to criticise the existing silence, or to make suggestions; but it does seem to me that instead of getting up pharmacology and the appearance of crude drugs it would be well to substitute some account of foods and feeding. When the medical man had to choose and select his raw material, from which, as an apothecary, he prepared extracts, tinctures and infusions, then such knowledge certainly had its value.

But now-a-days a medical man trusts his chemist and druggist for his medicines, and rarely even makes a fresh infusion. Consequently, this part of his studies is useless, and merely burdensome to the student, and an inroad upon time which has many demands upon it, and which is too precious, in every way, to be wasted. If this time were devoted to some account of food in health and sickness; of the preparation of food in relation to its digestion; of prepared food for infants and invalids and those actually ill; of the predigestion of foods; of the relation of various foods to sundry morbid conditions; it would be much better.

Possibly the absence of such lectures is to some extent due to the fact that a text-book available for such lectures did not exist. Dr. Pavy's book is most interesting and instructive; and the same may be said of King Chambers's Manual of Diet in Health and Disease; but neither form systematic treatises suitable for lecturing purposes. The writer has some hope that the present work has some claims to be such a book; but this may be no more than the vanity which is said to cling to authors.

Lectures are delivered yearly before the Royal College of Physicians of London, and we might have thought that the authorities of the College would have found some one to take up the subject of Food in Sickness during the last decade. Their apathy on the subject is on a par with their indifference in the matter of medical teaching. When a fish smells about the head it is useless to look for freshness at the tail, says a Turkish proverb, and so long as this ruling body in matters medical maintains an attitude of blank and supine indifference on the matter of food, so long nothing will be done. As an examining body a change would at once be inaugurated if a question on Dietetics were asked at the higher examination for the membership; but of this there seems as yet no prospect.

There is a better prospect in the United States, where the subject of Dietetics is in a much more advanced condition. "The Journal of Reconstructives" is a step forward which all must hail with satisfaction; while the efforts of the enterprising firms who prepare various forms of food are worthy of all commendation. As soon as the knowledge of foods and how to use them comes abreast the various preparations in the market, then a revolution in the feeding of the sick and infirm will be wrought. And the writer's concluding sentence is the expression of his belief that that much-to-be-desired revolution is close at hand.

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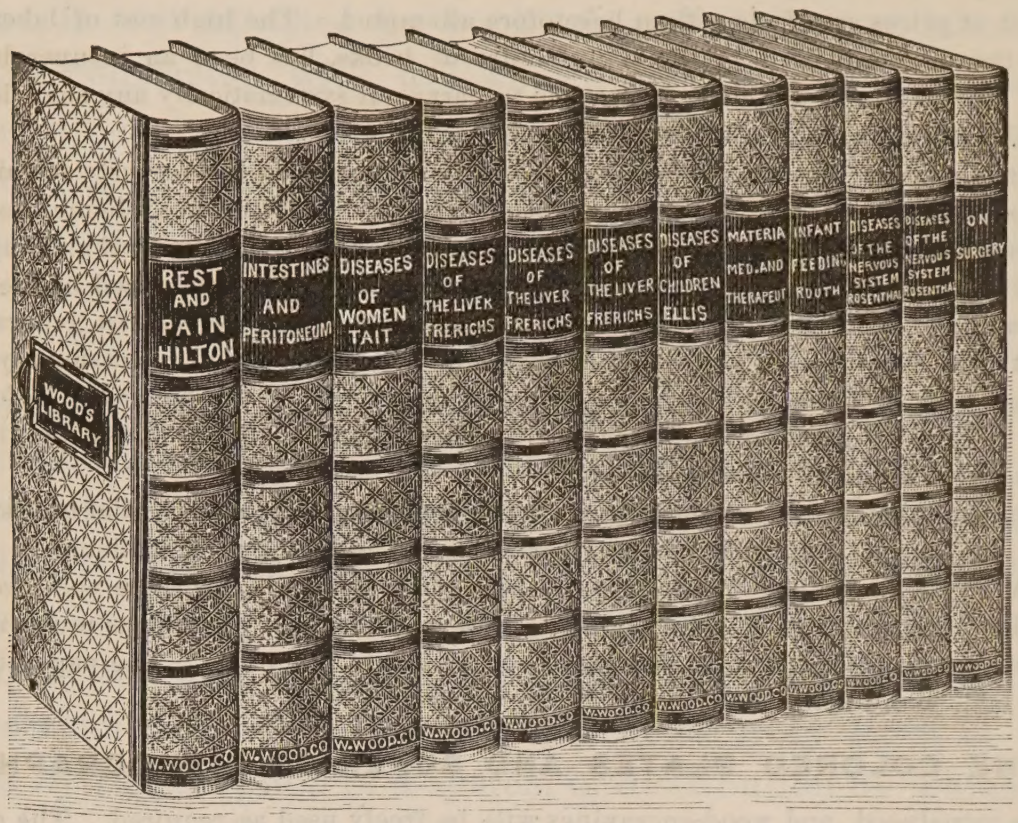

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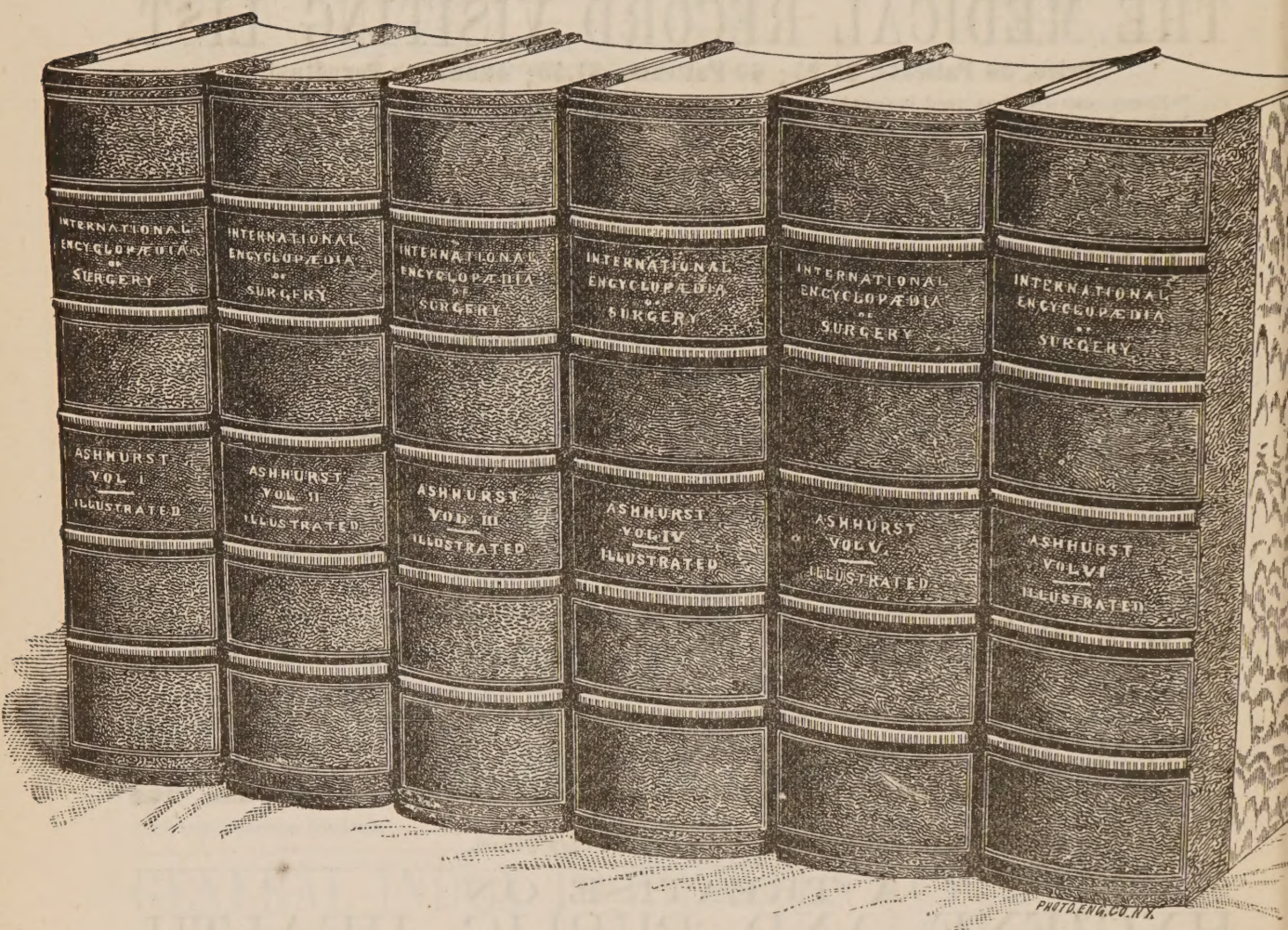

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INDEX.

PAGE

ALLEN, P. Lectures on Aural Catarrh..... 32
ANATOMICAL REMEMBRANCER..... 1
ASHBY, H. Memoranda of Physiology..... 17
ASHHURST, J. The International Encyclopædia of Surgery..... 25
BARTHOLOW, R. Spermatorrhœa..... 38
BARWELL, R. A Treatise on Diseases of the Joints..... 4
BAUER, L. Lectures on Orthopædic Surgery.. 23
BEARD, G. M. Nervous Exhaustion, Neurasthenia..... 35
BEDFORD, G. S. The Principles and Practice of Obstetrics..... 26
——— Clinical Lectures on the Diseases of Women and Children..... 26
BELFIELD, W. T. Diseases of the Urinary and Male Sexual Organs..... 38
BELL, A. N. Climatology..... 17
BENEDIKT, M. Anatomical Studies upon Brains of Criminals..... 37
BENNETT, J. H. Clinical Lectures on the Principles and Practice of Medicine... 8
BIGELOW, J. Nature in Disease..... 9
——— Brief Exposition of Rational Medicine..... 9
BINZ, C. The Elements of Therapeutics..... 15
BLYTH, A. W. The Analysis of Food and the Detection of Poisons..... 22
BOCK, C. E. Atlas of Human Anatomy with Explanatory Text..... 22
BODENHAMER, W. Practical Observations on Anal Fissure..... 13
——— Congenital Malformations of the Rectum and Anus..... 13
——— An Essay on Rectal Medication..... 13
——— On the Hemorrhoidal Disease..... 13
——— The Physical Exploration of the Rectum.. 13
BOSWORTH, F. H. Diseases of the Throat and Nose..... 33
BRAMWELL, B. The Diseases of the Spinal Cord..... 36
BRAUN, C. R. Uræmic Convulsions..... 27
BRISTOWE, WARDELL, and OTHERS. Diseases of the Intestines and Peritoneum..... 8
BROCKLESBY, J. The Amateur Microscopist. 21
BRODIE, B. Mind and Matter..... 18
BROWN, H. E. Report on Quarantine on the Southern and Gulf Coasts of the United States..... 15
BROWN, W. S. A Clinical Handbook on the Diseases of Women..... 28
BUCK, A. H. A Treatise on Hygiene and Public Health..... 46
——— Diagnosis and Treatment of Ear Diseases. 32
BURRALL, F. A. Asiatic Cholera..... 15
BUSEY, S. C. Congenital Occlusion and Dilation of Lymph Channels..... 41
BYFORD, W. H. A Treatise on the Theory and Practice of Obstetrics..... 27
CARNOCHAN, J. M. Congenital Dislocations of the Head of Femur..... 23
CARPENTER, W. B. The Microscope and Its Revelations..... 21
CARPENTER, W. M. An Index of Medicine. 10
CASTLE, F. A. Wood's Household Practice of Medicine..... 10
CAZENAVE and SCHEDEL. Manual of Diseases of the Skin..... 41
CHAPMAN, E. N. Hysterology..... 27
CHARCOT, J. M. Clinical Lectures on the Diseases of Old Age..... 5
——— Lecture on Bright's Disease..... 40
——— Lectures on Localization in Diseases of the Brain..... 37
CLARK, W. F. A Manual of the Practice of Surgery..... 23
CODE OF MEDICAL ETHICS..... 9

PAGE

COMSTOCK and COMINGS. Principles of Physiology..... 17
CORSON, J. W. On the Treatment of Pleurisy. 12
COULSON, W. J. Bladder and Prostate Gland. 38
CURTIS, E. Manual of General Medicinal Technology..... 9
DELAFIELD, F. Studies in Pathological Anatomy, Vol. I. and II..... 3
DELAFIELD and PRUDDEN. Pathological Anatomy and Histology..... 3
DELAFIELD and STILLMAN. A Manual of Physical Diagnosis..... 15
DE WECKER, L. Ocular Therapeutics..... 32
DICKINSON, W. H. On Renal and Urinary Affections..... 40
DIDAY, P. A Treatise on Syphilis in New-born Children..... 41
DRAPER, J. C. Laboratory Course in Medical Chemistry..... 45
DUNCAN, J. M. Perimetritis and Parametritis 25
——— On the Mortality of Child-bed and Maternity Hospitals..... 25
DWIGHT, T. Frozen Sections of a Child..... 30
EDES, R. T. Therapeutic Handbook of the United States Pharmacopœia..... 43
ELLIS and FORD. Illustrations of Dissections 2
ELLIS, E. Diseases of Children, with Formulary 29
EMMET, T. A. Vesico-Vaginal Fistula..... 28
ERB, W. Electro-Therapeutics..... 6
ERICHSEN, J. E. On Concussion of the Spine 36
FLINT, A. Compendium of Percussion and Auscultation..... 10
FOOTE, J. Ophthalmic Memoranda..... 30
——— Pharmacopœia and Universal Formulary. 43
FOTHERGILL, J. M. The Physiological Factor in Diagnosis..... 17
——— Indigestion, Biliousness, and Gout..... 14
FOWLER, E. P. Suppression of Urine..... 39
FOX, T. Skin Diseases..... 42
FRERICHS, F. T. Diseases of the Liver..... 8
FREY, H. The Microscope and Microscopical Technology..... 21
FRITSCH, H. Diseases of Women..... 28
GARRIGUES, H. J. Diagnosis of Ovarian Cysts 26
GARROD, A. B. Essentials of Materia Medica and Therapeutics..... 14
GODDARD, P. B. The Anatomy, Physiology, and Pathology of Human Teeth..... 24
GOULEY, J. W. S. Diseases of the Urinary Organs..... 39
GOWERS, W. R. Epilepsy, etc..... 36
——— Diagnosis of Brain Disease..... 36
GRAHAM, D. A Practical Treatise on Massage 6
GREGORY, G. Lectures on the Eruptive Fevers 7
GRIESINGER, W. Mental Pathology and Therapeutics..... 20
GUTTMAN, P. A Handbook of Physical Diagnosis..... 16
HAMILTON, A. McL. Types of Insanity..... 37
HAMILTON, F. H. The Principles and Practice of Surgery..... 22
HARRIS and POWER. Manual of the Physiological Laboratory..... 19
HARRISON, R. The Surgical Disorders of the Urinary Organs..... 38
HART and BARBOUR. Manual of Gynecology 28
HELMHOLTZ, H. The Ossicles of the Ear and Membrana Tympani..... 32
HENOCH, E. Lectures on Diseases of Children 30
HILTON, J. On Rest and Pain..... 3
HOLDEN and SHUTER. Human Osteology. 2
HOLMES, T. A System of Surgery by Various Writers..... 23
HOOPER'S PHYSICIAN'S VADE MECUM. A Manual of the Principles and Practice of Physic..... 9
HOSPITAL PLANS..... 46

Index.

PAGE

HUN, H. A Guide to American Medical Students in Europe 46
INGALS, E. F. Diagnosis and Treatment of Diseases of the Chest, Throat, and Nasal Cavities 12
JACOBI, A. A Treatise on Diphtheria 34
JAMES, P. Laryngoscopy and Rhinoscopy 24
JOHNSON, L. A Medical Formulary 43
——— A Medical Botany 17
JOHNSON and MARTIN. The Influence of Tropical Climates on European Constitutions 46
KEETLEY, C. B. An Index of Surgery 22
KELSEY, C. B. Diseases of the Rectum and Anus 12
KEYES, E. L. Venereal Diseases 41
KIRBY, F. O. A Treatise on Veterinary Medicine 46
KIRKE'S HANDBOOK OF PHYSIOLOGY. 18
KLOB, J. M. Pathological Anatomy of the Female Sexual Organs 27
KNAPP, H. On Intraocular Tumors 31
LAMBERT, T. S. Primary Systematic Human Physiology, Anatomy, and Hygiene 18
LEWIN, L. The Incidental Effects of Drugs 45
LIDELL, J. A. Apoplexy 36
LIVEING, R. On Treatment of Skin Diseases. 41
——— Diagnosis of Skin Diseases 41
LONGSTRETH, M. Rheumatism, Gout, and some of the Allied Diseases 4
LOOMIS, A. L. Lectures on Fevers 11
——— On Diseases of the Respiratory Organs, Heart, and Kidneys 11
——— A Text-book of Practical Medicine 11
——— Lesson in Physical Diagnosis 16
LYMAN, H. M. Artificial Anæsthesia and Anæsthetics 4
MACKENZIE, M. Diseases of the Pharynx, Larynx, and Trachea 34
MILTON, J. L. Pathology and Treatment of Gonorrhœa 38
MILLARD, H. B. On Bright's Disease of the Kidneys 39
MORGAN, C. E. Electro-Physiology and Therapeutics 6
MUNDE, P. F. Minor Surgical Gynecology 25
MURCHISON, C. On Functional Derangements of the Liver 8
NEUBAUER AND VOGEL. A Guide to the Qualitative and Quantitative Analysis of the Urine 38
NOYES, H. D. On the Diseases of the Eye 30
OLDBERG, O. and WALL, O. A. A Companion to the United States Pharmacopœia 44
OWEN, R. The Skeleton and the Teeth 25
PARKES, E. A Manual of Practical Hygiene 46
PARTRIDGE, E. L. A Manual of Obstetrics 25
PAUL, C. Diseases of the Heart 10
PAVY, F. W. On Food and Dietetics 22
PEABODY, G. L. Supplement to Ziemssen's Cyclopædia 10
PHARMACOPŒIA OF THE UNITED STATES 42
PHILLIPS, C. D. F. Materia Medica and Therapeutics (Vegetable Kingdom) 14
——— Materia Medica and Therapeutics (Inorganic Substances) 14
PICTURES FOR PHYSICIANS' OFFICES AND LIBRARIES 45
PIFFARD, H. G. A Guide to Urinary Analysis 40
——— On the Materia Medica and Therapeutics of the Skin 40
PILCHER, L. S. The Treatment of Wounds 24
POULET, A. On Foreign Bodies in Surgical Practice 24
PRESCRIBER'S MEMORANDA 20
PUTZEL, L. On Common Forms of Functional Nervous Diseases 36
QUAIN'S Elements of Anatomy 1
RANNEY, A. L. Practical Medical Anatomy 2
——— A Practical Treatise on Surgical Diagnosis. 16
RICE, C. Posological Table 44

PAGE

RICHET, C. Physiology and Histology of the Cerebral Convolutions 36
RINGER, S. Hand-book of Therapeutics 13
ROBINSON, B. On Nasal Catarrh and Allied Diseases 34
ROCKWELL, A. D. Lectures on Electricity (Dynamic and Franklinic) 6
ROOSA, D. B. ST. J. On the Diseases of the Ear 33
——— Vest-Pocket Medical Lexicon 9
——— Ophthalmic and Otic Memoranda 31
ROSENTHAL, M. On the Diseases of the Nervous System 35
ROSS, J. A Treatise on the Diseases of the Nervous System 34
ROUTH, C. H. F. Infant Feeding and its Influence on Life 30
SALTER, H. H. On Asthma: Its Pathology and Treatment 33
SALTER, J. A. Dental Pathology and Surgery. 24
SATTERTHWAITE, T. E. A Manual of Histology 19
SAVAGE, H. The Surgical Pathology 28
SEE, G. Diseases of the Lungs 33
SEGUIN, E. Idiocy and its Treatment by the Physiological Method 37
——— Medical Thermometry and Human Temperature 7
SEMELEDER, F. Rhinoscopy and Laryngoscopy 34
SIMS, J. M. On Uterine Surgery 26
SKENE, A. J. C. Diseases of the Bladder and Urethra in Women 26
SMITH, E. On Disease in Children 29
STEEL, J. H. Outlines of Equine Anatomy 46
STELLWAG, C. On the Eye, including the Anatomy of the Organ 31
STERNBERG, G. M. and MAGNIN, A. Bacteria 46
STERNBERG, G. M. Malaria and Malarial Diseases 46
STEWART, T. G. On Bright's Disease of the Kidneys 40
STRICKER, S. A Manual of Histology 20
STURGIS, F. R. Medical Topics 46
TAIT, L. Diseases of Women 28
——— On Diseases of the Ovaries 28
TAYLOR, C. F. Mechanical Treatment of Diseases of the Hip-Joint 24
THUDICHUM, J. L. W. A Manual of Chemical Physiology 19
THOMSON, A. T. A Conspectus of the Pharmacopœias of the London, Edinburgh, and Dublin Colleges of Physicians and Surgeons 43
TIDY, C. M. Legal Medicine 10
TILT, E. J. A Handbook of Uterine Therapeutics 28
TROUSSEAU, A. Treatise on Therapeutics 14
VERRIER, E. Practical Manual of Obstetrics. 27
VIDAL, A. On Venereal Diseases 41
VISITING LIST 46
VON TROELTSCHE, A. Diseases of the Ear in Children 33
WAGNER, E. A Manual of General Pathology 4
WEISSE, F. D. The Demonstrator 1
WENDT, E. C. A Treatise on Asiatic Cholera. 15
WEST, C. How to Nurse Sick Children 29
WILSON, E. The Students' Book of Cutaneous Medicine and Diseases of the Skin 41
WILSON, J. C. On the Continued Fevers 7
WITTHAUS, R. A. Essentials of Chemistry, Inorganic and Organic 45
——— The Medical Students' Manual of Chemistry 45
INDEX RERUM 5
WYETH, J. A. A Handbook of Medical and Surgical Reference 23
——— Essays in Surgical Anatomy and Surgery 23
ZIEMSSEN, H. VON. Cyclopædia of the Practice of Medicine 10
ZIEGLER, E. A Textbook of Pathological Anatomy and Pathogenesis 2